

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-264136
(43)Date of publication of application : 26.09.2000

(51)Int.Cl. B60R 16/02
H02G 11/00

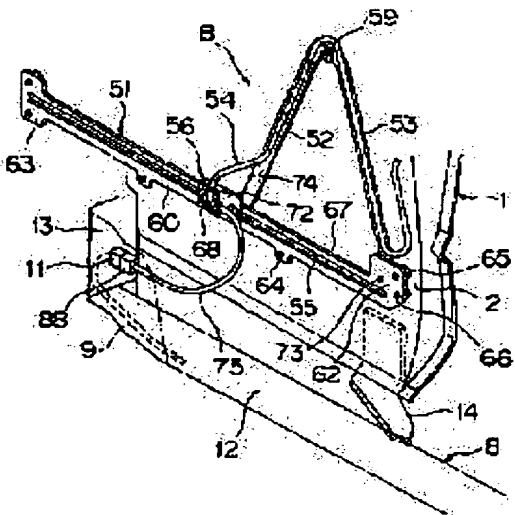
(21)Application number : 11-374770 (71)Applicant : YAZAKI CORP
(22)Date of filing : 28.12.1999 (72)Inventor : MUROFUSHI SATORU
DOSHITA KENICHI

(30)Priority
Priority number : 11005314 Priority date : 12.01.1999 Priority country : JP

(54) FEEDING STRUCTURE FOR AUTOMOBILE SLIDE DOOR

(57)Abstract:

PROBLEM TO BE SOLVED: To feed a current at all the time from a vehicular body side to a slide door side by a simple structure.
SOLUTION: A slider 56 is engaged with a guide portion 51 in a slide door opening/closing direction of a slide door 1, and a wire harness 54 of the door side is fixed on the slider 56, and a bending portion 75 is formed between the slider 56 and the vehicular body side on the wire harness 54. A united pair of link arms 52, 53 is connected to the slider 56 at one end, and pivotally supported by the slide door 1 side at the other end, thereby arranging the wire harness 54 from the link arms 52, 53 to the slider 56. The guide portion 51 can be made from a reinforcing material of the slide door 1. A circular arc-shaped second guide portion can be provided on the slide door 1 side, and a slide engaging portion of a joint 59 between the pair of the link arms 52, 53 can be engaged with the second guide portion.



LEGAL STATUS

[Date of request for examination] 24.03.2003
[Date of sending the examiner's decision of rejection]
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of

rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention makes the slider which fixed the wire harness by the side of a slide door engage with the guide section free [a slide], and relates to the electric supply structure of the slide door for automobiles which set always constant the connecting location of the wire harness by the side of the slide door at the time of slide door closing motion, and the wire harness by the side of a car body.

[0002]

[Description of the Prior Art] In order to connect to the wire harness by the side of a car body (power-source side) each auxiliary machinery, such as the internal power window motor and internal door-lock unit of the slide door looked at by a one-box car and some passenger cars, and a loudspeaker, through door wire harness, conventionally various means are provided.

[0003] Drawing 22 shows the electric supply structure of the conventional slide door for automobiles indicated by JP,4-124555,U as an example, each auxiliary machinery 102 in a slide door 101 is connected to wire harness 104 through a controller 103, and the terminal of wire harness 104 is connected to one contact 105 of the door front end section. The contact 107 of another side is formed in a car-body 106 side, and the contact 107 is connected to the dc-battery 109 through wire harness 108. The contact 107 by the side of a car body is connected to the contact 105 by the side of a slide door through the traveling contact which is not illustrated for protection against dust and waterproofing.

[0004] However, if it was in the above-mentioned structure, energization was performed only at the time of close [of a slide door 101], and after the door 101 had opened, there was a fault that actuation of auxiliary machinery, such as closing motion of a power window and a loudspeaker, was not performed. Moreover, since it was the so-called double contact to which both the contacts 105,107 are connected through the traveling contact protection against dust and for waterproofing, there was concern that the dependability of the increase of contact resistance and connection fell.

[0005] Moreover, apart from the above-mentioned structure, as electric supply structure (not shown) in the general door for buildings, the arm of two hollow is connected with JP,5-28893,U with a revolving shaft in the air, one arm is fixed to door, the arm of another side is fixed to a building, and the structure of making an electric wire inserting in the interior of an arm is proposed.

[0006] However, although it can respond when a door carries out the switching action of a concentric circle with one shaft if it is in this structure What [carries out the switching action which is two-dimensional like the slide door of an automobile, and includes curvilinear actuation] It could not apply to what carries out a three-dimensions-switching action, and the problem that structure is enlarged and complicated by hypertrophy of an arm, and an arm tended to make a deflection, an allophone, etc. at the time of closing motion, and there was concern of being hard to perform smooth closing motion.

[0007] On the other hand, the electric supply structure of the slide door for automobiles shown in drawing 23 (a), (b) - drawing 24 (a), and (b) is proposed by JP,7-222274,A. In the structure of drawing 23 (a) and (b), a bearing bar 113 is attached along with the guide rail 112 by the side of the car body 117 to a slide door 111, a bearing bar 113 is looped around the electric wire (wire harness) 114 of a curl configuration, the end side of an electric wire 114 is connected to the loudspeaker 116 of a slide door 111 through a hinge region 115, and the other end side of an electric wire 114 is connected to the audio body by the side of a car body (not shown). Drawing 23 (a) An electric wire 114 is prolonged along with a bearing bar 113 at the time of door close, and it is drawing 23 (b). An electric wire 114 is shrunken at the time of door open, and is contained at it.

[0008] Moreover, in the structure shown in drawing 24 (a) and (b), in connection with the switching action of a slide door 118, the reel 120 which can roll [a delivery and] round round an electric wire (wire harness) 119 is formed in a car-body

121 side, the end side of an electric wire 119 is connected to the loudspeaker 123 by the side of a door through a hinge 122, and the other end side of an electric wire 119 is connected to the audio by the side of a car body (not shown).

Drawing 24 (a) It lets out an electric wire 119 from a reel 120 at the time of door close, extends, and is drawing 24 (b). An electric wire 119 is rolled round by the reel 120 at the time of door open.

[0009] However, if it is in the structure of drawing 23 (a) and (b), in order to use the electric wire 114 of the elastic letter of curl, the top which needs the storage space of an electric wire 114 had concern that the continuous-line length of an electric wire 114 became long inevitably, and electric transmission loss became large. When the number of circuits increases especially or a thick electric wire is used, the diameter of curl will have to be enlarged and continuous-line length will increase further.

[0010] Moreover, if it was in the structure of drawing 24 (a) and (b), according to the die length of an electric wire 119, it rolled round with the count of rolling up of a reel 120, relating with the shaft diameter, when there were few counts of rolling up, the shaft diameter became large, equipment *****ed, and the device in which a twist of an electric wire 119 was prevented also had to be included in the reel 120, and also when the number of circuits increased or a thick electric wire was used, there was a problem that where of equipment *****ed. Moreover, since an electric wire 114, 119 is repeatedly crooked in both the structures of drawing 23 (a), (b) - drawing 24 (a), and (b) by the curl volume or the reel volume, while being hard to perform smooth actuation, when it was easy to mourn over the electric wire (circuit section) 114, 119 and the number of an electric wire 114, 119 was increased, flexibility worsened and there was a problem that it could not respond to connection of the auxiliary machinery of other types.

[0011]

[Problem(s) to be Solved by the Invention] This invention, without being intermittent in a contact in view of the trouble in each above-mentioned conventional structure While reducing the electric transmission loss in which it can respond to the rounded switching action in the three dimensions of a slide door easily, and wire harness originates in a ***** The complication and hypertrophy of structure (equipment), and a raise in cost which can cancel the bruise resulting from repeat crookedness of wire harness, and originate in a curl volume, a reel volume, etc. of wiring in an arm or an arm or wire harness, and aggravation of operability can be prevented. Faults, such as the deflection and allophone at the time of being able to apply to a thin slide door and using an arm, and badness of a motion, can also be prevented. Moreover, even if it increases the number of circuits, the flexibility of wire harness is good, can respond to much auxiliary machinery, and aims to let **** and terminal treatment of wire harness offer the electric supply structure of the easy slide door for automobiles.

[0012]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention prepares the guide section of the slide door closing motion direction in a slide door, and is made to engage a slider with this guide section, enabling free slide, the wire harness by the side of a slide door is fixed to this slider, and the electric supply structure of the slide door for automobiles characterized by forming a bend in this wire harness between this slider and a car-body side is adopted (claim 1). It is also effective to have prepared the harness support guide in said slide door [above said guide section], to have applied to said slider from this harness support guide, and to have hung said wire harness (claim 2). Moreover, it is also effective to have had the take-up reel which energizes said slider in the direction of slide door closing (claim 3). Moreover, prepare the guide section of the slide door closing motion direction in a slide door, make a slider engage with this guide section, enabling a free slide, connect the end side of the link arm of the pair connected with this slider, the other-end side of the link arm of this pair is made to support to revolve to this slide door side, and the electric-supply structure of the slide door for automobiles characterized by ****(ing) wire harness is collectively adopted as this slider from the link arm of this pair (claim 4). It is also effective in said wire harness between said slider and a car-body side to have formed the bend (claim 5). Moreover, having connected with said slider by the shank and having been engaged free [the slide to the guide hole of said guide section] for this shank also has the effective end side of the link arm of said pair (claim 6). Moreover, it is also effective that the coil member was extrapolated by the bend of said wire harness (claim 7). It is also effective that said coil member has been arranged to the both ends of said bend (claim 8). Moreover, it is also effective that said guide section was constituted by the reinforcing materials of said slide door (claim 9). Said reinforcing materials are **** type tabular reinforcing materials, and it is also effective that the guide hole as said guide section was formed in this tabular reinforcing materials (claim 10). It is effective that said reinforcing materials are also bar-like reinforcing materials (claim 11). moreover, said slide door side -- the second radii-like guide section -- preparing -- this -- it is effective to also have made the slide engagement section of the link arm of said pair engage with the second guide section, enabling a free slide (claim 12). Moreover, it is also effective that each guide hole as said guide section and said second guide section was formed in the inner panel or the plate (claim 13). Moreover, it is also effective that said slide engagement section was prepared in the connection section of the link arm of said pair (claim 14).

Moreover, it is also effective that the periphery of the guide hole as said second guide section was engaged between the flanges of this pair including the flange which a pair counters [said slide engagement section] (claim 15). one side of the flange of said pair -- a minor diameter -- and it is also effective that it was formed in the major diameter, and the insertion hole to one [this] flange was opened for free passage and prepared in the edge of this guide hole rather than the guide hole which is said second guide section (claim 16). Moreover, said guide section of it being a guide rail tabular [long] is also effective (claim 17). Moreover, it is also effective that the link arm of said pair has been arranged upward to said guide section (claim 18). Moreover, it is effective that said wire harness is also a cabtire cable (claim 19).

[0013]

[Embodiment of the Invention] The example of the gestalt of operation of this invention is explained at a detail using a drawing below. Drawing 1 - drawing 9 show the first operation gestalt of the electric supply structure (equipment) of the slide door for automobiles concerning this invention.

[0014] The guide rail (guide section) 3 horizontal to the lower part side of the inner panel 2 of a slide door 1 like drawing 1 is formed. A slide block (slider) 4 engages with a guide rail 3 free [a slide]. And a slide block 4 is pulled by the take-up reel 5 in the back of a door aperture, i.e., the direction. The pars intermedia of the wire harness 6 by the side of a door is fixed to a slide block 4. One side of wire harness 6 is supported by the guide idler (guide section) 7, and another side of wire harness 6 is crooked in the shape of abbreviation for U characters, and is connected with the wire harness 9 by the side of a car body by connectors 10 and 11 at the car-body 8 side (dc-battery side). In this book, the car travelling direction is appointed at the front.

[0015] The feeder system A of the slide door for automobiles of this example consists of the guide rail 3, a slide block 4, take-up reel 5, and a guide idler 7. A take-up reel 5 is fixed to the inner panel 2 of a slide door 1 in the back of a guide rail 3, and the guide idler 7 is attached free [rotation] in the height direction pars intermedia of the inner panel 2. Each connectors 10 and 11 of the wire harness 6 and 9 by the side of a door and a car body are being fixed inside the vertical wall 13 of the step section 12 of a car body 8. The slide door 1 is engaging with the lower limit side with the hinge roller 14 free [a slide on the rail 15 (drawing 7) by the side of a car body].

[0016] a guide rail 3 -- truth -- the slit (long hole)-like guide hole 17 is formed in direct band-like Itabe's 16 center of the height direction, and fixed parts 18-20 are formed in Itabe's 16 both ends and longitudinal direction pars intermedia, it grows into them, and each fixed parts 18-20 are being fixed to the inner panel 2 with the bolt 22 through the ring-like spacer 21. Between the inner panel 2 and the guide rail 3, the clearance 23 for board thickness between spacers 21 is constituted. The shank (pivot) 24 of a slide block 4 penetrates to the guide hole 17 of a guide rail 3, and it engages with it for example, the flange (not shown) at the tip of a shank 24 is located in the clearance 23 between the backgrounds of a guide rail 3. Bearing (not shown) is prepared in the periphery of a shank 24, and a slide block 4 moves smoothly horizontally along with the long hole-like guide hole 17 because bearing ***** to the guide hole 17.

[0017] The take-up reel 5 has the spring means (not shown) for rolling round a wire 26 inside the body 25 of a reel, and the wire 26 extended from the nozzle 27 is always energized in the ***** direction. The tip of a wire 26 is connected with the back end of a slide block 4. The slide block 4 is always back energized by it. In case a take-up reel 5 closes a slide door 1, it is for making a slide block 4 easy to move back (migration being assisted). The tensile force by the take-up reel 5 is a thing of extent which stretches the wire harness 6 by the side of a door with the pin.

[0018] Moreover, a guide idler (harness support guide) 7 consists of rollers 29 of a pulley-like fluting which can rotate freely through bearing in the surroundings of the shank 28 fixed to inner PANARU 2 in the upper part of a guide rail 3, and a shank 28. The wire harness 6 by the side of a door begins to separate into the cross-section semicircle-like slot 30, and it is engaging with it that there is nothing. In addition, it is also possible to use the guide shaft (harness support guide) which replaces with the guide idler 7 which can be rotated freely, and fixed does not illustrate. It cannot be overemphasized that the same slot 30 as a guide shaft is formed.

[0019] The wire harness 6 by the side of a door is in the condition hung from the guide idler 7, and is rocked by migration of a slide block 4. The point side of wire harness 6 is horizontally prolonged in a distance short ahead of a guide idler 7, and is connected to the connector of the wire harness of auxiliary machinery called the power window motor, door lock, and loudspeaker inside a slide door which are not illustrated by the connector 31 by the side of the tip of wire harness 6. The connector 31 is being fixed to the inner panel 2.

[0020] The lower part of the wire harness 6 which continues to the slide-block 4 empty-vehicle object 8 side curves in the shape of abbreviation for U characters towards the front, and follows the wire harness 9 by the side of the car body which is a power-source line through connectors 10 and 11 through this bend 38 like the above-mentioned. The wire harness 9 by the side of a car body continues to the front (dc-battery side) in accordance with the inside of the wall of step 12. For example, it is a male, and one connector 10 has a receptacle (not shown) inside connector housing made of synthetic resin (a sign 10 is substituted), and the connector 11 of another side is a female mold, and it has the male terminal (not shown)

inside connector housing (a sign 11 is substituted).

[0021] A slide block 4 is formed in the shape of a rectangle, has the step 32 by which notching was carried out in the center of a longitudinal direction, and is made to project like drawing 2 in the condition of having curved the wire harness 6 by the side of a door ahead of the step 32. The second half section of a slide block 4 is formed heavy-gage, and it is fixed so that the polymerization of the pressure plate 34 may be made to carry out in the direction of board thickness of a heavy-gage part 33 and wire harness 6 may be inserted. Bulge formation of the arch section 35 which curved at about 90 degrees is carried out at a pressure plate 34, the slot 36 corresponding to the arch section 35 is formed in a heavy-gage part 33, a pressure plate 34 is fixed to a heavy-gage part 33 with a machine screw 37, and wire harness 6 is pinched between a slot 36 and the arch section 35.

[0022] It is equipped so that a coil spring (coil member) 39 may be twisted around the periphery of the bend 38 of the shape of U character of the wire harness 6 by the side of a door between a slide block 4 and a connector 10. while a coil spring 39 orients the bend 38 of wire harness 6 -- a bend 38 -- rubbing -- etc. -- from -- it protects. Orientation of a bend 38 is for maintaining a bend 38 at the condition of having been crooked gently (setting right), preventing bending, flapping, etc. of a bend 38 accompanying migration of a slide block 4, and preventing breakage of wire harness 6.

[0023] The spring force contacts the step 32 of a slide block 4, and the fitting side of a connector 10 by pressing at end-face 10a of the opposite side, and the both ends of a coil spring 39 separate from a step 32 or end-face 10a, and do not slip down. It is possible to also make the both ends of a coil spring 39 fix to a slide block 4 and a connector 10 with a stop means (not shown). It is possible to set the bore of a coil spring 39 as less than [the outer diameter of wire harness 6, an EQC, or it], and to also make it stick to the peripheral face of wire harness 6.

[0024] Like drawing 3, it is also possible to limit in the bend 38 of the wire harness 6 by the side of a door to two by the side of a slide block 4 and a connector 10, and to extrapolate coil springs (coil member) 40 and 41 partially. Adhesion immobilization of the tip of coil springs 40 and 41 is carried out at the step 32 of a slide block 4, and end-face 10a of a connector 10. It is also possible to stick the bore of coil springs 40 and 41 on the periphery of a bend 38 like the example of drawing 2. Since the both ends of a bend 38 are oriented by coil springs 40 and 41, also by migration of a slide block 4, a bend 38 maintains a U character configuration and always does so the same effectiveness as the example of drawing 2.

[0025] Like drawing 4, the cabtire cable is used as wire harness 6 of this example. A cabtire cable is JIS. Arrange two or more electric wires 42-43 inside, it is filled up with the insulators 44, such as polyethylene foam, among two or more electric wires 42-43, the outside of an insulator 44 is made to put the vinyl insulation sheath 45, and two kinds of electric wires 42 and 43 with which sizes differ are made to insert in in this example, as shown also in C3327.

[0026] By using a cabtire cable as wire harness 6, the wire harness 6 of a perfect cross-section circle configuration can be obtained. Since it is uniform, without the flexibility of wire harness 6 being different with the crookedness direction, while a **** activity until it carries out a connector joint through a slide block 4 from the guide idler 7 of drawing 1 easily. The configuration holdout in a bend 38 is good, and cutting of the wire harness 6 at the time of moreover attaching a connector 10, peeling, and terminal treatment called terminal sticking by pressure are also easy.

[0027] Like drawing 5, in the state of closing of a slide door 1, the slide block 4 was pulled by the wire 26 of a take-up reel 5, and was located in the back end section of a guide rail 3, and the wire harness 6 by the side of a door inclined and started ahead from the slide block 4, was supported by the guide idler 7, and is prolonged to the front connector 31. The shank 24 (drawing 1) of a slide block 4 is located in near at the back end in contact with the back end of the guide hole 17 of a guide rail 3. By the slide block 4 being pulled with the take-up reel 5, migration of the slide block 4 under car transit is prevented, and wear, an allophone, etc. accompanying slack or slack of the wire harness 6 by the side of a door are prevented.

[0028] From the slide block 4, the bend 38 (refer to drawing 1) of wire harness 6 is extended to the car-body side. The bend 38 (drawing 1) is being fixed by the connector joint in the step section 12 of a car body 8. As for a connector and 46, 10 is [a windowpane and 47] handles in drawing 5.

[0029] Since the bend 38 of wire harness is connected with the car-body side like drawing 6, in the state of the aperture of a slide door 1, a slide block 4 moves to the front end section of a guide rail 3, and is located. It means that a slide block 4 is in the almost same location as the closing condition of the slide door 1 of drawing 5, and a slide door 1 leaves a slide block 4, and had retreated correctly. Although the wire 26 of a take-up reel 5 was lengthened and the slide block 4 is pulled back, the slide block 4 is stopped by the holding power of the bend 38 of wire harness 6 to the front.

[0030] In case a take-up reel 5 closes a slide door 1 in the direction of arrow-head I like drawing 5, it assists a slide block 4 and back is made it to carry out slide migration smoothly. Although wire harness 6 is rocked between a guide idler 7 and a slide block 4 at the time of closing motion of a slide door 1, a guide idler 7 supports the wire harness 6 at the time of rocking by low frictional force, and makes crookedness actuation of the wire harness 6 in alignment with the periphery of

a guide idler 7 perform smoothly. Although wire harness 6 produces slack at the time of rocking, it is also possible to prepare the slack absorber style (not shown) which pulls the rocking section 48 of wire harness 6 to the front thru/or back.

[0031] Like drawing 7, a slide door 1 is located in the same field as the lateral surface of a car body 8 in the state of closing of a slide door 1. The hinge roller 14 by the side of the lower limit of a slide door 1 is located in the front end of ramp 15a by the side of before a rail 15. The bend 38 of the wire harness 6 (drawing 1) by the side of a door is crooked in the shape of [in which the root narrowed in the top view] abbreviation for U characters, and is located in the back end side of a slide door 1.

[0032] Like drawing 8, a slide door 1 projects outside greatly in accordance with the crookedness configuration of a rail 15 in the middle of the aperture of a slide door 1. A slide block 4 (drawing 6) is located in the middle of the guide rail 3 (drawing 6) of a slide door 1, and the bend 38 of wire harness 6 (drawing 1) is opened greatly broadly, and is crooked in the shape of abbreviation for U characters. The hinge roller 14 moves along with true straight-part 15b from ramp 15a of a rail 15.

[0033] Like drawing 9, in the aperture condition of a slide door 1, a slide door 1 is located in parallel along with the lateral surface of a car body 8, and the hinge roller 14 is located in the back end side of true straight-part 15b of a rail 15. A slide block 4 (drawing 6) is located in the front end side of a slide door 1, and the bend 38 of wire harness 6 (drawing 1) presents the letter of the abbreviation for U characters which was pulled a little back and inclined.

[0034] According to this operation gestalt, it can respond to the rounded switching action in the three dimensions of a slide door 1 smoothly by having formed the bend 38 in the wire harness 6 (cable) by the side of a door. Moreover, the wire harness 6 by the side of a door is hung from the central upper part of a slide door 1, and since it is the easy device in which it justifies by the slide block 4 connected with the take-up reel 5, overall depth (dimension of the thickness direction of a door) can be made small, and it can apply to the thin slide door 1. Moreover, since the cable was adopted as wire harness 6 by the side of a door, **** and terminal treatment are easy.

[0035] Moreover, since it is the structure which binds the pressure plate 34 of a slide block 4 tight with a machine screw 37, and fixes the wire harness 6 by the side of a door, the desorption activity of wire harness 6 is easy, and assemblability and maintenance nature are good. Moreover, since it applied to the slide-block 4 empty-vehicle object side and the wire harness 6 by the side of a door was incurvated in the shape of U character, while crookedness actuation of the wire harness 6 at the time of slide door closing motion is smoothly performed in a bend 38, expansion and contraction and tensile force of wire harness 6 are absorbed by the elasticity of a bend 38, and the bruise of wire harness 6 is prevented with it. by extrapolating especially the coil springs 39-41 to a bend 38, while a bend 38 is protected from interference with the exterior, configuration maintenance of a bend 38 is performed positively, and expansion and contraction of wire harness 6 and the absorption effect of tensile force are promoted, and a slide block 4 holds to predetermined [on a guide rail 3] in a location at the time of slide door closing motion -- having -- the rocking section 48 (drawing 5) of wire harness 6 -- flustering -- etc. -- an unnecessary motion is prevented. Moreover, unnecessary attitude actuation of a slide block 4 is prevented by the take-up reel 5 at the time of slide door closing motion, a slide block 4 is held in a location predetermined [on a guide rail 3], and the same effectiveness as the above is done so.

[0036] Drawing 10 - drawing 15 show the second operation gestalt of the electric supply structure (equipment) of the slide door for automobiles concerning this invention. The feeder system B of the slide door for automobiles of this example loses the take-up reel 5 (drawing 1) of a precedent, forms it for two link arms (pair) 52 and 53 in a guide rail (guide section) 51, enabling free closing motion, **** the wire harness 54 by the side of a door along with two link arms 52 and 53, and is made to expand and contract it by the switching action of two link arms 52 and 53 like drawing 10.

[0037] The guide rail 51 horizontal to the lower part of the inner panel 2 of a slide door 1 is fixed like a precedent, and the slide block (slider) 56 is engaging with the guide hole 55 of the long hole configuration of a guide rail 51 free [a slide]. The end section of the first link arm 52 is connected with the slide block 56 free [rotation] through the shank 57 (drawing 11). The end section of the second link arm 53 is connected with the front end section of a guide rail 51 free [rotation] through a shank 58 (drawing 11), and the other end of the first link arm 52 and the other end of the second link arm 53 are connected with the revolving shaft 59. Both the links arms 52 and 53 stand up upward in the shape of reverse V character. Other configurations are the same as that of the first operation gestalt in general. The feeder system F of the slide door for automobiles of this example consists of a guide rail 51, a slide block 56, and two link arms 52 and 53

[0038] a precedent -- the same -- a guide rail 51 -- truth -- the slit-like guide hole 55 is formed in direct band-like Itabe's 60 center of the height direction, and fixed parts 62-64 are formed in Itabe's 60 both ends and longitudinal direction parts intermedia, it grows into them, and each fixed parts 62-64 are fixed to the inner panel 2 with a bolt 66 through the ring-like spacer 65. Between the inner panel 2 and the guide rail 51, the clearance 67 for board thickness between spacers 65 is

constituted.

[0039] The shank (pivot) 68 of a slide block 56 penetrates and engages with the guide hole 55 of a guide rail 51, and the flange 69 (drawing 13) at the tip of a shank 68 is located in the clearance 67 between the backgrounds of a guide rail 51. A shank 68 can be freely rotated by bearing 70 (drawing 13), and a slide block 56 moves smoothly horizontally along with the guide hole 55 by it.

[0040] Moreover, on the background of a guide rail 51, the end section of the first link arm 52 is connected with the first portion (thin-walled part) 72 of a slide block 56 by the shank 71 (refer to drawing 12 and drawing 13). The end section of the first link arm 52 is located in said clearance 67, and moves to a slide block 56 and one along the rear face of a guide rail 51.

[0041] The other end of the second link arm 53 is connected with the other end of the first link arm 52 by the shank 59, where a lap is carried out. The end section of the second link arm 53 is connected with the background of the fixed part 6 by the side of the tip of a guide rail 51 free [rotation] by the shank 73. The end section of the second link arm 53 is also located in a clearance 67. The connection structure of these links arms 52 and 53 is later mentioned by drawing 12 - drawing 13 .

[0042] In drawing 10 , the wire harness 54 by the side of a door is ****(ed) in the shape of abbreviation reverse V character along each front face of the first link arm 52 and the second link arm 53 from a slide block 56, is turned up in the shape of U character from the lower limit side of the second link arm 53, and the connector joint is carried out to the wire harness by the side of the auxiliary machinery in a slide door 1 (not shown). Wire harness 54 is being fixed to each link arms 52 and 53 with the band clip which is not illustrated. In the both sides of wire harness 54, two or more pairs of holes 74 for immobilization are formed in each link arms 52 and 53. Wire harness 54 has some extra length in the upper part of a shank 59.

[0043] Both the links arms 52 and 53 open and close forward and backward (telescopic motion), and wire harness 54 expands and contracts in the link arms 52 and 53 and one with migration of a slide block 56. When the incorporation path of the wire harness 54 within a slide door 1 is on the both-ends side of a slide door 1 at the same time it assists migration of a slide block 56, both the links arms 52 and 53 are involved with hanging-down prevention of wire harness 54, and bearing prevention. The same work as the take-up reel 5 (drawing 1) of a precedent is carried out in that retreat actuation of a slide block 56 is assisted.

[0044] It is an indispensable condition to be arranged so that both the links arms 52 and 53 may be arranged above a guide rail 51 and it may open in the shape of reverse V character, the self-weight of the link arms 52 and 53 becomes easy to open the link arms 52 and 53, and retreat actuation of a slide block 67 is ensured by the big force. Both the links arms 52 and 53 become gradually large from the condition halfway opened in the shape of reverse V character like drawing 10 , and the force of retreating a slide block 56 with the link arms 52 and 53 is certainly pushed aside by the slide block 56 to the back end side of a guide rail 51 at the time of full open of a slide door 1.

[0045] As a continuous line shows, both the links arms 52 and 53 are closed completely, stand up at right angles to facing up, and like drawing 12 , they open both the links arms 52 and 53 in the shape of [of HE] a character like the chain line in the state of the close by-pass bulb completely of a slide door 1 in the state of full open of a slide door 1 (drawing 10). If both the links arms 52 and 53 are horizontally expanded in a straight line in the state of the close by-pass bulb completely of a slide door 1, since both the links arms 52 and 53 lock and a slide door 1 (drawing 10) stops opening, it is necessary to make 53 hold in the shape of [of both the links arms 52 and HE] a character in the state of the close by-pass bulb completely of a slide door 1. Since it opens in the shape of [of both the links arms 52 and 53 HE] a character and the slide block 56 is back pressed in the state of the close by-pass bulb completely of a slide door 1 as it is also by self-weight migration of the slide block 56 under car transit is prevented, and wear, an allophone, etc. accompanying slack or slack of the wire harness 54 (drawing 10) by the side of a door are prevented.

[0046] In case both the links arms 52 and 53 close, it opens from a condition and it shifts to a condition, the shank 59 of the center which connects both the links arms 52 and 53 draws a radii-like locus, and moves. The switching action of both the links arms 52 and 53 is performed because a slide block 56 moves along with a guide rail 51, and a slide block 56 is maintained at the almost same location by the bend 75 of wire harness 54 (drawing 10).

[0047] Like the above-mentioned, the end section of the first link arm 52 is connected with the thin-walled part 72 in the first half of a slide block 56 by the shank 71, and the end section of the second link arm 53 is connected with the fixed part 62 by the side of before a guide rail 51 by the shank 73. A fixed part 62 projects more nearly up than the horizontal guide hole 55, and is located, and the shank 73 is located above the front end of the guide hole 55. The shank 71 of the first link arm 52 penetrates the guide hole 55, it is located, and the second link arm 52 is formed a little shorter than the first link arm 52. Thereby, it is easy to close and the first link arm 52 has become being easy to open. The bolt insertion holes 76-78 are formed in the fixed parts 62 and 63 of the both sides of a guide rail 51, and the fixed part 64 of

ongitudinal direction middle.

[0048] Like drawing 13, from inner PANARU 2 of a slide door 1, a guide rail 51 opens the clearance 67 for spacer 65 minutes, and counters, and one edge each of the first link arm 52 and the second link arm 53 is located in a clearance 67. The slide block 56 is engaging with the guide hole 55 of a guide rail 51 free [a slide] by the shanks 68, such as a pin and a bolt. Bearing 70 is formed in the guide hole 55 at the periphery of a shank 68, slide resistance is reduced, a flange 69 thrusts, and is fixed at the tip of a shank 68 by bearing 70, and positioning maintenance of the slide block 56 is carried out by the flange 69 at the guide rail 51.

[0049] Moreover, penetrate the thin-walled part 72 in the first half of a slide block 56, the guide hole 55 of a guide rail 51, and the end section of the first link arm 52, and a shank 71 is formed. Flanges 79 and 80 are formed in the both ends of a shank 71, and bearing 81 is formed in the periphery of a shank 71 in the guide hole 55 and the end section, respectively. A shank 71 slides on the inside of the guide hole 55 by the low force by each bearing 81, and the first link arm 52 rotates the surroundings of a shank 71 smoothly. A slide block 56 carries out slide migration of the inside of the guide hole 55 by two shanks 68 and the shank 71 approximately at stability.

[0050] Moreover, the other end of the first link arm 52 and the other end of the second link arm 53 are penetrated, a shank 59 is formed, flanges 82 and 83 are formed in the both ends of a shank 59, bearing 84 is formed in the periphery of a shank 59, and both the links arms 52 and 53 are smoothly rotated by bearing 84.

[0051] Moreover, it is arranged through the annular spacer 85 on the background of a fixed part 62, and the end section and a spacer 85 are penetrated, the shank 73 which is a bolt is formed, bearing 86 is formed in the periphery of a shank 73 in the end section, and the second link arm 53 rotates the end section of the second link arm 53 smoothly by bearing 86. The shank 73 is thrust into the inner panel 2 through the flange 87.

[0052] In drawing 10, the lower part of the wire harness 54 which continues to the slide-block 56 empty-vehicle object 8 side curves in the shape of abbreviation for U characters towards the front, and the bend 75 follows the wire harness 9 by the side of the car body which is a power-source line through connectors 88 and 11. The wire harness 9 by the side of a car body continues to the front (dc-battery side) in accordance with the inside of the wall of the step section 12.

[0053] Like drawing 14, the slide block 56 was formed in the shape of a rectangle, countered the flange 80 following the shank 71 ahead of [52] the central step 89 (i.e., the first link arm), and the bend 75 of wire harness 54 has projected it. Like a precedent, the second half section of a slide block 56 is formed heavy-gage, and it is fixed so that the polymerization of the pressure plate 91 may be made to carry out in the direction of board thickness of a heavy-gage part 90 and wire harness may be inserted. Bulge formation of the arch section 92 which curved at about 90 degrees is carried out at a pressure plate 91, the slot 93 corresponding to the arch section 92 is formed in a heavy-gage part 90, a pressure plate 91 is fixed to a heavy-gage part 90 with a machine screw 94, and wire harness 54 is pinched between a slot 93 and the arch section 92.

[0054] Like the precedent, it is equipped so that a coil spring (coil member) 95 may be twisted around the periphery of the bend 75 of the shape of U character of the wire harness 54 by the side of a door between a slide block 56 and a connector 88. while a coil spring 95 orients the bend 75 of wire harness 54 -- a bend 75 -- rubbing -- etc. -- from -- it protects. The both ends of a coil spring 95 are contacted by pressing according to the spring force in the step 89 of a slide block 56, and end-face 88a of a connector 88.

[0055] Like drawing 15, it is also possible to limit in the bend 75 of the wire harness 54 by the side of a door to two by the side of a slide block 56 and a connector 88, and to arrange coil springs 96 and 97 (coil member) partially. Adhesion immobilization of the edge of each coil springs 96 and 97 is carried out at the step 89 of a slide block 56, and end-face 88 of a connector 88. Although the same is said of drawing 14, it is also possible to stick the bore of coil springs 96 and 97 on the periphery of a bend 75. Since the both ends of a bend 75 are oriented by coil springs 96 and 97, a bend 75 always maintains a U character configuration also by migration of a slide block 56.

[0056] The cabtire cable is used as wire harness 54 like the first operation gestalt (refer to drawing 4). Since flexibility is uniform, while the wire harness 54 of a perfect cross-section circle configuration can be obtained by using a cabtire cable and the **** activity to both the links arms 52 and 53 and a **** activity until it makes it curve from a slide block 56 and makes it connect with the connector 11 of the wire harness 9 by the side of a car easy-ize, the configuration holdout in a bend 75 is good, and the terminal treatment at the time of moreover attaching a connector 88 is also easy.

[0057] In drawing 10, each connectors 88 and 11 of the wire harness 54 and 9 by the side of a door and a car body are being fixed inside the vertical wall 13 of the step section 12. The slide door 1 is engaging with the lower limit side with the hinge roller 14 free [a slide on the rail 15 (drawing 7) by the side of a car body]. Since the bend 75 of wire harness 54 is supported by the connector joint by the car-body side like the precedent, a slide block 56 moves to the front end section of a guide rail 51 at the time of the aperture of a slide door 1. Correctly, a slide door 1 leaves a slide block 56, and retreats.

[0058] The operation shown in drawing 7 of the first operation gestalt - drawing 9 shall be the same also in this operation gestalt, and shall read the sign 38 of the bend in drawing 7 - drawing 9 as a sign 75. That is, a slide door 1 is located in the same field as the lateral surface of a car body 8 in the closing condition of the slide door 1 of drawing 7. The hinge roller 14 by the side of the lower limit of a slide door 1 is located in the front end of ramp 15a by the side of before a rail 15. The bend 75 of the wire harness 54 (drawing 10) by the side of a door is crooked in the shape of [in which origin narrowed in the top view] abbreviation for U characters, and is located in the back end side of a slide door 1.

[0059] A slide door 1 projects outside greatly in accordance with the crookedness configuration of a rail 15 in the middle of the aperture of the slide door 1 of drawing 8. A slide block 56 (drawing 10) is located in the middle of a slide door 1, and the bend 54 of wire harness 54 (drawing 10) is opened greatly broadly, and is crooked in the shape of abbreviation for U characters. The hinge roller 14 moves along with true straight-part 15b from ramp 15a of a rail 15.

[0060] In the aperture condition of drawing 9 and a slide door 1, a slide door 1 is located in parallel along the side face of a car body 8, and the hinge roller 14 is located in the back end side of true straight-part 15b of a rail 15. A slide block 56 (drawing 10) is located in the front end side of a slide door 1, and the bend 75 of wire harness 54 (drawing 10) presents the letter of the abbreviation for U characters which was pulled a little back and inclined.

[0061] According to the operation gestalt of the above second, since it is the easy structure where wire harness 54 was mated and attached in a slide block 56 and the link arms 52 and 53, overall depth can be made small and it can apply to the thin slide door 1. Moreover, since wire harness 54 was supported using the link arms 52 and 53 of a pair, on the inner panel 2, neither wire harness's 54 hanging down [slack or] at the time of closing motion of a slide door 1, nor a debt takes place, and it is not worn [wire harness 54 contacts, and] out, and wire harness 54 is protected certainly. Moreover, since a slide block 56 is certainly returned to a position in the retreat actuation by the self-weight of the link arms 52 and 53 at the time of closing of a slide door 1, impossible **** of the bend 75 by the return delay of wire harness 54, i.e., the **** load to a connector 88, is prevented.

[0062] Moreover, since it could respond to the rounded switching action in the three dimensions of a slide door 1 smoothly and the cabtire cable was used as wire harness 54 by the side of a door by the bend 75 of wire harness 54 like said gestalt, **** and terminal treatment are easy. Moreover, it is the same as that of said gestalt that there are protection of the improvement in the attachment-and-detachment workability of wire harness 54, smooth-izing of crookedness actuation of the wire harness 54 by the bend 75 and the expansion and contraction of wire harness 54 by the pressure plate 91 of a slide block 56, the absorption of tensile force, and the bend 75 by coil springs 95-97 and a configuration maintenance operation.

[0063] In addition, although each above-mentioned operation gestalt showed the structure of having formed guide rails 3 and 51 and moving the wire harness 6 and 54 by the side of a door to a slide door side by slide blocks 4 and 56 and one Prepare a guide rail in a car-body side, and the wire harness by the side of a car body is fixed to the slide block which engaged with the guide rail. It is also possible to consider as the structure which carries out a connector joint to the wire harness by the side of a door through the bend of the shape of U character of the wire harness by the side of a car body, in this case, the slide door 1 of drawing 1 shall be read as a car body, and a car body 8 shall be read as a slide door.

[0064] Drawing 16 shows the third operation gestalt of the electric supply structure of the slide door for automobiles concerning this invention. This structure supports to revolve the end side of the link arm 125,126 which the pair connected to a slide door 127 side, uses it as the guide rail (guide section) with which a slide block 128 is made to engage free [a horizontal slide] in the structure which connected the other-end side with the slide block (slider) 128, and is characterized by to form the guide hole 130 which is a long hole of the shape of a slit horizontal to the tabular reinforcing materials 129 using the tabular reinforcing materials 129 who are reinforcement members for the cure against a side collision.

[0065] The guide rail in said second operation gestalt is abolished, and components mark and components cost are reduced by having considered as instead of [of a guide rail] using the tabular reinforcing materials 129 for the existing cure against a side collision, and the man day with a group in a guide-rail simple substance is reduced. Moreover, the weight of a part without a guide rail and a slide door 127 is mitigated.

[0066] The tabular reinforcing materials 129 are formed in the shape of a wave type, and the slit-like guide hole 130 is formed in the flat part 132 of the ***** 131 bottom. ***** 131 followed each **** 133 of the shape of a character to abbreviation which followed juxtaposition by two thru/or the number beyond it in the vertical direction, and each **** 133 of a top and the bottom -- a half -- Yamabe -- it consists of 134. a lower half -- Yamabe -- said flat part 132 of the width of face of a flat part 132 is almost equal to one width of face of Yamabe 133 following 134. the front face of a flat part 132, and top-most-vertices 133a of each **** 133 -- the almost same height (height of the slide door thickness direction) -- being located -- top-most-vertices 133a of each **** 133 -- said guide hole 130 -- the same -- horizontal -- parallel -- being located -- top-most-vertices 133a of each **** 133, and an upper half -- Yamabe -- the rear face of the

link arm 125,126 of a pair can carry out line contact, and can **** on the top-most vertices of 134 by the small sliding friction.

[0067] Originally, although it is for raising the tabular reinforcing materials's 129 rigidity, also in order for ***** 131 to reduce a touch area with the link arm 125,126 of a pair and to make the switching action of the link arm 125,126 perform smoothly, it is effective. Whether it is a little lower than the die length (height of the vertical direction) of the link arm 125,126 just before stopping mostly like drawing 16 or the width of face of the tabular reinforcing materials's 129 vertical direction is high, it is not cared about. the tabular reinforcing materials 129 are comparable as full [of a slide door 127] -- it is -- carrying out -- it is a little short and the flat part 135 with a narrow trough is being fixed to the inner panel 137 of a slide door 127 with the fixed means of bolt 136 grade.

[0068] Front end section 126a of the link arm 126 by the side of before is supported by the flat part 132 of the tabular reinforcing materials 129 bottom free [rotation] by the shanks 138, such as a bolt. The shank 138 is located a little in the front end bottom of the guide hole 130. although the same is said of said second operation gestalt, it is that the shank 138 by the side of before is located in the latest of a guide rail or the slit-like guide hole 130, and the switching action of the link arm 125,126 is small -- it is carried out smoothly.

[0069] Like the second operation gestalt, the link arm 125,126 of a pair is connected by the central shank 139, and back end section 125a of the link arm 125 on the backside is supported by the slide block 128 free [rotation] by the shank 140 **** immobilization is carried out along with the link arm 125,126 of a pair, and wire harness 141 is ****(ed) upward along with top-most-vertices 133a of each **** 133 of the tabular reinforcing materials 129 from the front end side of the link arm 126 by the side of before, and is connected to an electric equipment article, auxiliary machinery, etc. in a slide door 127. Since wire harness 141 touches mostly top-most-vertices 133a of each **** 133 of the tabular reinforcing materials 129 by point contact, the slide contact resistance and contact friction by the side of the wire harness 141 at the time of closing motion of the link arm 125,126 and a slide door are small, wire harness 141 is worn, and ***** is prevented.

[0070] Wire harness 141 curves positively through a slide block 128 from the link arm 125 on the backside, and is connected to the wire harness 143 by the side of the car body by the connector 144 by the back end side of step 142 by the side of bend 141a empty vehicle both this body.

[0071] Drawing 17 shows the structure with a group of a slide block (slider) 128, like drawing 14 of said second operation gestalt, a slide block 128 is divided into the body part 144 and a pressure plate 145, and the wire harness hold slot 149 of the letter of a curve which counters the heavy-gage part 146 in the second half of the body part 144 in the slot 148 inside the arch section 147 of a pressure plate 145 is formed. In the condition of having fitted wire harness 141 (drawing 16) into the hold slot 149, a pressure plate 145 is fixed to a heavy-gage part 146 with two or more machine screws 150.

[0072] the hold slot 149 -- the backside is adjoined a little and the shank 151 (drawing 16) on the backside is formed in a heavy-gage part 146. The shank 151 on the backside consists of a bolt 152, a nut member 153, and a ring 171. The nut member 153 protrudes in the center of the flange 154 which touches the tabular reinforcing materials's 129 rear face, and a flange 154, has the female screw hole 155 inside, and consists of the boss sections 156 located in the slit-like guide hole 130. A ring 171 engages with the periphery of the boss section 156 free [rotation], and ****s to the inside of the guide hole 130. A bolt 152 is inserted in the insertion hole 157 of a heavy-gage part 146 from the front-face side of a heavy-gage part 146, and is screwed in by the female screw hole 155 of the boss section 156.

[0073] Back end section 125a of the link arm 125 on the backside is supported free [rotation] by the shank 140 (drawing 16) by the side of before by the thin-walled part 158 in the first half of the body part 144 of a slide block 128. The shank 140 by the side of before consists of rings 164,166 which engage with the male screw member 159, the female screw member 160, and each **** member 159,160. The male screw member 159 consists of a flange 161 which touches the tabular reinforcing materials's 129 rear face, the boss section 162 which protrudes in the center of a flange 161 and is located in the guide hole 130, and the bolt section 163 which protrudes in the center of the boss section 162 and penetrate the guide hole 130. A ring 164 engages with the periphery of the boss section 162 free [rotation], and ****s to the inside of the guide hole 130.

[0074] The female screw member 160 protrudes in the center of the flange 165 which touches the front face of the back end section of the link arm 125 on the backside, and a flange 165, and is located in the pore 170 of the link arm 125, it consists of the boss sections 168 which have the female screw hole 167 inside, a ring 166 engages with the periphery of the boss section 168, and the periphery of a ring 166 engages with a pore 170. The slide member 128 ****s to the guide hole 130 smoothly by the low sliding friction with each ring 171,164 of order, and is smoothly rotated with the ring 166 by the side of before. The structure of drawing 17 is the same as the structure of drawing 14 .

[0075] In the structure which drawing 18 supported to revolve the end side of link arm 125' which the pair connected, and 126' to the slide door 172 side like the operation gestalt of the above third, and connected the other end side with the slide

block (slider) 173 It considers as the guide rail (guide section) made a slide block 173 engaged enabling a free horizontal slide, and is characterized by using the bar-like reinforcing materials 173 of the pipe configuration which is a reinforcement member for the cure against a side collision.

[0076] As for the bar-like reinforcing materials 174, the order both ends are being firmly fixed to the inner panel 176 of a slide door 172 with the bracket 175. Each bracket 175 consists of the leg 177 of a pair, a wall 178 of the perpendicularly the leg 177 is connected, and the tubed fitting section 179 really formed in the wall 178. Insertion immobilization of each edge of the bar-like reinforcing materials 174 is carried out at each tubed fitting section 179, and the leg 177 and the flange 180 of one are fixed to the inner panel 176 with a bolt 181. The bolt 181 of the bracket 175 top by the side of before serves as the shank which supports the front end section of link arm 126' by the side of before.

[0077] By being supported by the bracket 175, from the front face of the inner panel 176, the bar-like reinforcing materials 174 open distance a little, and are located in parallel with the inner panel 176. A little larger slide block 173 is engaging with the bar-like reinforcing materials 174 free [a slide].

[0078] As the detail structure of a slide block 173 is shown in drawing 19, a slide block 173 is made from synthetic resin and it is constituted possible [division] in the direction of board thickness, and the Brock body 182 of inner panel 176 approach is formed in the shape of an abbreviation rectangle, and the Brock body 183 of vehicle room approach is formed in the configuration which cut the before side upper part in the shape of a rectangle. The sliding slot 184 of a cross-section hemicycle is horizontally formed in the bottom half section of both the block body 182,183, and each sliding slot 184 coalesces and has a bore [major diameter / outer diameter / of the bar-like reinforcing materials 174 / a little]. It is also possible to form each sliding slot 184 in a major diameter further, to carry out fitting immobilization of the sleeve (not shown) of the half-rate of a low sliding friction, and to slide the bar-like reinforcing materials 174 in accordance with the inside of a sleeve.

[0079] The crookedness slot 185 where the cross-section hemicycle for holding wire harness 141' in the condition of having made it curving positively curved is formed in the Johan section of each block body 182,183. The fixed hole 186 for supporting back end section 125a[of link arm 125' on the backside] ' free [rotation] by shank 140' is formed in the Brock body 182 of inner panel 176 approach like drawing 18. Both the block body 182,183 is in the condition to which the bar-like reinforcing materials 174 were made to engage with, and fitting of wire harness 141' was carried out, and coalesce immobilization is carried out with two or more machine screws 187.

[0080] In drawing 18, it is connected free [closing motion] by central shank 139', and **** immobilization of wire harness 141' is carried out along with link arm 125' of a pair, and 126', and link arm 125' of a pair and 126' are positively projected through a slide block 173, curve, are turned up by the Ushiro sense, and the connector joint is carried out to wire harness 143' by the side of the car body by the step posterior part.

[0081] Since it is not necessary to newly prepare a guide rail, while components cost, and the number of shipfitters and attachment cost of components are reduced according to the structure which used the bar-like reinforcing materials 174 of drawing 18 also [guide rail], lightweight-ization of a slide door 172 is attained. Especially, since a guide rail 174 has the shape of a pipe in the air, it is lightweight. the case where were hard to bend, pried at the time of closing motion of link arm 125' of a pair, and 126', and the force etc. acts since the bar-like reinforcing materials 174 are excellent in flexural rigidity although it was also the same as when using solid cylinder-like bar-like reinforcing materials (not shown) -- a knee -- there is nothing -- truth -- it can be located direct and a slide block 173 can be ***** smoothly.

[0082] In addition, bar-like reinforcing materials can apply the thing of various configurations, such as the shape of the shape not only of a cross-section round shape but a cross-section triangle, or an L type. Moreover, it is also possible to apply the structure of the guide rail shown in drawing 16 - drawing 19 to the guide rail of the first operation gestalt (drawing 1 - drawing 9).

[0083] Drawing 20 - drawing 21 show the fourth operation gestalt of the electric supply structure of the slide door for automobiles concerning this invention. This structure is arranged free [crookedness of the link arm 191,192 of the pair connected with the inside side of a slide door 1 like drawing 20 in the shape of / as a wire harness holddown member / abbreviation reverse V character]. Wire harness 193 is ****(ed) along with the link arm 191,192 of a pair. While the first guide hole (guide section) 195 prolonged in Masanao at the car cross direction is formed in the plate-like plate 194 by the side of the inside of a slide door 190 The second guide hole (guide section) 196 which curved in the shape of radii with the first guide hole 195 up side is formed. End section 191a of the link arm 191,192 of a pair is supported to revolve free [rotation] by the plate 194. The other end 192a side of the link arm 191,192 of a pair engages with the first guide hole 195 free [a slide], and it is characterized by engaging the shank 197 of the center which is the connection section of the link arm 191,192 of a pair free [a slide] at the second guide hole 196.

[0084] A plate 194 is formed in the shape of a rectangle with a metal plate or a synthetic-resin plate, and the peripheral edge section is being fixed to the inner panel 199 of a slide door 190 with the bolt 198. It is also possible to form the

direct, first, and second guide holes 195, 196 in the inner panel 199, without using a plate 194. In that case, it is necessary to form evenly the part of the inner panel 199 which forms both the guide holes 195, 196 at least.

[0085] In the lower limit section approach of a plate 194, the first guide hole 195 is formed horizontally. A little in the front end section top of the first guide hole 195, front end section 191a of the link arm 191 by the side of before is connected with the plate 194 by the shank 200 by the side of before. The link arm 191 by the side of before can be freely rotated focusing on a shank 200. In this specification, it is in agreement with order car travelling direction order.

[0086] It is connected by the shank 197 of the center the link arm 191 by the side of before and whose link arm 192 on the backside are said connection sections. Back end section 192a of the link arm 192 on the backside is supported to revolve with a shank 202 free [rotation] at the front end side of the rectangle Brock-like slide block (slider) 201, and the slide block 201 is engaging with the first guide hole 195 free [a slide] through the near shank 203 the back in parallel with a shank 14. The flange (not shown) which ****s at the rear face of a plate 194 is prepared in the shank 203. It is possible to also make the shank 202 by the side of before engage with the first guide hole 195 free [a slide] with the shank 203 on the backside. The pars intermedia of wire harness 193 is being fixed to the slide block 201 by the half-rate-like cylinder part material 204.

[0087] Along with the link arm 192 on the backside, **** immobilization is carried out from the link arm 191 by the side of before, and wire harness 193 curves from a slide block 201, and is connected to the wire harness 204 by the side of the body of the car body by the connector 206 near the step section of the body of the car body. Moreover, wire harness 193 is introduced into the interior of a slide door 190 from the link arm 191 by the side of before, and is connected to the electric equipment article which is not illustrated in a slide door. the link arm 191, 192 of the pair connected in the shape of abbreviation reverse V character, and truth -- the configuration using the first guide hole 195, direct slide block 201, and direct plate 194 is replaced with the tabular reinforcing materials in the third operation gestalt of said drawing 16, and is almost the same as the configuration using a plate 194.

[0088] The link arm 191, 192 of a pair is connected in the crowning, and the shank 197 of the center which is the connection section is engaging with the second radii-like guide hole 196 free [a slide]. This point is the description part which is not in said operation gestalt. Blurring and with backlash are prevented because the shank 197 which is the connection section of the link arm 191, 192 of a pair engaged with the second radii-like guide hole 196 free [a slide]. [of the link arm 191, 192]

[0089] The second guide hole 196 is arranged at the first portion bottom of the first guide hole 195, front end 196a of the second guide hole 196 is located in mist or back from front end 195a of the first guide hole 195 in the upper limit section of a plate 194, and the back end of the second guide hole 196 is located in the longitudinal direction pars intermedia bottom of the first guide hole 195 in the height direction pars intermedia of a plate 194. The link arm 191 by the side of before moves circularly considering the shank 200 by the side of before as a core, and the direction's [the radii configuration and the curve direction] of the guide hole 196 of the second corresponds with the rotation locus of the point 197 of the link arm 191 by the side of before, i.e., the connection section of the link arm 191, 192 of a pair.

[0090] The insertion hole 207 of a circle diameter [major diameter / dimension / D / of the guide hole 197 / width-of-face] is formed in the back end section of the second guide hole 196. The flange 208 (drawing 21) of the central shank 197 is inserted from this insertion hole 207, it is located in the rear-face side of a plate 194, and a slide contact becomes possible along the periphery 209 of the second guide hole 196 by the rear-face side. When the location of the insertion hole 207 stops a slide door 190, it is arranged in the location at which the central shank 197 does not arrive. The die length of the second guide hole 196 is set up for a long time than the rotation locus of the link arm 191 by the side of before [at the time of closing motion of a slide door 190]. Although the central shank 197 moves towards a back end side from the front end side of the second guide hole 196 as a slide door 190 is shut to the front, a shank 197 is located before the insertion hole 207 at the time of the close by-pass bulb completely of a slide door 190.

[0091] It is prevented by this that the central shank 197 separates from the second guide hole 196 at the time of closing motion of a slide door 190, and the link arm 191, 192 of a pair is always supported by stability with the second guide hole 196 that there is nothing with backlash. Moreover, the activity to which the central shank 197 is made to engage with the second guide hole 196 with the insertion hole 207 easy-izes.

[0092] In addition, it is also possible to adopt the same configuration as the insertion hole 207 as engagement to the shank 202, 203 before and behind a truth first direct guide hole 195 and slide-block 201 side. That is, the insertion hole [major diameter / flange / (not shown) / of a shank 202, 203] (not shown) is formed in the back end section of the first guide hole 195. The die length of the first guide hole 195 is set up so that the backmost shank 203 may not reach the insertion hole at the time of closing motion of a slide door 190.

[0093] Drawing 21 is the C-C sectional view of drawing 20 showing the engagement condition of the central shank 197 and the second guide hole 196 of the shape of radii of a plate 194 which are the connection section of the link arm

191,192 of a pair. The central shank 197 has the first flange 208 and second flange 210 which countered the front rear face of a plate 194 so that a plate 194 might be inserted. Even if it says that it inserts, it does not touch strongly, but each flange 208,210 touches the periphery 209 of the second guide hole 196 weakly with the clearance between some. Both the flanges 208,210 act as the slide contact section to the periphery of the second guide hole 196.

[0094] The first flange 208 is formed in the end face side of the axial short cylinder-like body 211 rather than the inner width of face of the second guide hole 196 at a major diameter, and is formed in a minor diameter from the bore of the insertion hole 207 (drawing 20) of guide hole termination. The second flange 210 is formed in the major diameter in the longitudinal direction parallel to the axial body 211 rather than the first flange 208 and insertion hole 207 (drawing 20). The circumferential groove 212 made the periphery section 209 of the second guide hole 196 of a plate 194 engaged among both the flanges 208,210, enabling a free slide is constituted. The slide engagement section 213 to the second guide hole 196 consists of an axial body 215 and both flanges 208,210. The central shank 197 equips one with the slide engagement section 213.

[0095] The first flange 208 is inserted in the rear-face side of a plate 194 from the insertion hole 207 (drawing 20), and the axial body 211 is engaged free [a slide] in the second guide hole 196. When the first flange 208 by the side of a minor diameter is inserted into the insertion hole 207, the second flange 210 by the side of a major diameter contacts the front face of a plate 194. The distance between the first flange 208 and the second flange 210 can be a little larger than the board thickness of a plate 194, and both the flanges 208,210 can **** along the front rear face of a plate 194. The clearance between each flange 208,210 and a plate 194 has the small link arm 191,192 of a pair to extent which does not generate backlash and an allophone to a plate 194.

[0096] The minor diameter male screw section 214 is formed in the tip side of the axial body 211, and the nut member 215 with a collar is screwed in the male screw section 214. The circular hole 216 of the connection side edge section of phosphorus AKUMU 191 by the side of before is extrapolated by the axial body 211 through a color 217, and the circular hole 218 of the connection side edge section of the link arm 192 on the backside is extrapolated by the shank 220 of the nut member 215 through the color 219. It is equipped with the washer 221 between both the links arms 191,192. The flange 222 of the nut member 215 is in contact with the link arm 192 on the backside free [sliding]. The link arm 191,192 of a pair is held free [rotation] between the second flange 210 and the third flange 222. It binds tight to the third flange 222 and the engagement hole 223 to an ingredient (not shown) is formed in it.

[0097] In addition, it is also possible to use the ring E which is not illustrated as the second flange 210, a washer, etc. In the case of a ring E, a circumferential groove is formed in the axial body 211, and in the case of a washer, it dashes against the axial body 211, it forms a step, and it is made not to sandwich a plate 194 strongly between the first flange 208.

[0098] In drawing 20 , the slide door 190 is engaging with the guide rail by the side of the body of the car body (not shown) free [a slide] in the slide section 224. In the condition of aperture halfway (full open nearness) of the slide door 190 of drawing 20 , the link arm 191,192 of a pair stands up in the shape of abbreviation reverse V character, and is located. By making a slide door 190 slide back from this condition, and making it full open, it rotates ahead by using the shank 200 by the side of before as the supporting point, and the link arm 191,192 of a pair stands up almost perpendicularly. Under the present circumstances, a slide block 201 moves to the front end side of the first guide hole 195, and moves the central shank 197 to the front end side of the second guide hole 196.

[0099] Moreover, it follows on making a slide door 190 slide ahead and stopping from the condition of drawing 20 , and a slide block 201 moves back along with the first guide hole 195, and opens the link arm 191,192 of a pair in the shape of [to abbreviation] a character like the chain line. Under the present circumstances, the central shank 197 moves back in the shape of radii along with the second guide hole 196. The link arm 191 by the side of before rotates the shank 200 by the side of before as the supporting point, and the central shank 197 draws a radii-like locus along with the second guide hole 196 in connection with it.

[0100] In addition, it is fixed to the body side of the car body with flexibility by bend part 193a following the body side of slide-block 201 empty-vehicle both the bodies, and closing motion (telescopic motion) actuation of the link arm 191,192 of the pair accompanying closing motion of a slide door 190 by it is possible for wire harness 193. At the time of closing motion of a slide door 190, bend part 193a of wire harness 193 does not move so much substantially with a slide block 201, but only a slide door 190 moves it forward and backward. It means that the slide block 201 had moved relatively to the slide door 190 by that cause.

[0101] Since the link arm 191,192 of a pair is engaging with the second guide hole 196 of a plate 194 in the connection section 197 of the center, also by the impact at the time of the switching operation of a slide door 190, and car transit, or vibration The link arm 191,192 and shank 197 of a pair rub against the internal surface and other components which are not illustrated of a slide door 190, or it does not collide. Moreover, there is no **** squirrel ***** with backlash of

191,192 link arm of a pair mutually, and, thereby, generating of a blemish, the allophone [the wire harness 193 on the link arm 191,192 or a link arm,] of a slide door 190, etc. is prevented.

[0102] In addition, in the operation gestalt of the above fourth, it is also possible to replace with the first [of a plate 194] and second guide holes 195,196, and to fix to the inner plate 194 of a slide door 190 directly each guide rail (not shown) which has each guide hole. Moreover, it is also possible to use not two or more electric wires but one electric wire and a cable as wire harness 193. Moreover, it is also possible to replace with the central shank 197 and to prepare the slide engagement section (not shown) to the second guide hole 192 near the connection section of the link arm 191 by the side of before.

[0103] Moreover, it is also possible to replace with and use the structure of the guide hole 195 of the fourth operation gestalt (drawing 20) for the guide rail 3 of the first operation gestalt (drawing 1). Moreover, it is also possible to apply the structure which extrapolated the coil member 39 (drawing 2) to the bend of the wire harness in the first operation gestalt, the structure which has arranged the coil member 41 (drawing 3) to the both ends of a bend, and the configuration whose wire harness is a cable 6 (drawing 4) to the above third and the fourth operation gestalt. Moreover, it is also possible to apply the second guide hole 196 of the fourth operation gestalt and the structure of the slide engagement section 213 to the structure using the bar-like reinforcing materials 174 of drawing 18 of the third operation gestalt especially.

[0104]

[Effect of the Invention] While a slider is held by the bend of wire harness in about 1 orientation like the above at the time of the switching operation of a slide door according to invention of claim 1 and five publications Attitude actuation of the some of a slider and bending deformation of the wire harness resulting from a three-dimensions-motion of a slide door are permitted. Since the tensile force and compressive force of wire harness at the time of switching operation are absorbed with the elasticity of a bend, while being able to respond to the rounded switching action in the three dimensions of a slide door easily, the **** load to the bruise and connector of wire harness is prevented. Moreover, since the line length of the wire harness by the side of a slider empty vehicle object, i.e., the line length of a bend, is short and it ends, the electric transmission loss in which wire harness originates in a ***** is reduced.

[0105] Moreover, according to invention according to claim 2, wire harness hangs from a harness support guide to a slider, and since it is the structure which wire harness rocks forward and backward at the time of the switching operation of a slide door, overall depth of a slide door cannot be taken but it can apply to a thin slide door.

[0106] moreover -- since a slider is disciplinarily returned to an orientation by the take-up reel at the time of aperture actuation of a slide door and a restoration operation of the slider by the bend is assisted, while a smooth reset action and orientation-ization of a slider are promoted according to invention according to claim 3 -- wire harness -- fluttering -- etc. -- it is stopped and smooth rocking is attained. Moreover, a feeder system consists of easy structures of the guide section, a slider, a harness supporter, and a take-up reel, and structure simplifies and miniaturizes.

[0107] Moreover, since the link arm of a pair expands and contracts (closing motion) and slide actuation of a slider is assisted at the time of the switching operation of a slide door, while according to invention according to claim 4 a slider and wire harness move smoothly relatively to a slide door and orientation-ization of a slider is promoted, the force with wire harness impossible for is not applied between sliders a car-body side, but wire harness is protected. Moreover, since the link arm is supporting wire harness, the wire harness at the time of the switching operation of a slide door is worn, and **, and wire harness's hanging down and the debt at the time of a slide door close by-pass bulb completely are prevented. Moreover, since wire harness is crooked in one with the link arm of a pair at the time of the switching operation of a slide door, crookedness actuation of wire harness is ensured [smoothly and]. Moreover, a feeder system consists of easy structures of the link arm of the guide section, a slider, and a pair, and structure is simplified and miniaturized.

[0108] Moreover, according to invention according to claim 6, rotation (switching action) of a link arm and slide actuation in alignment with the guide section are smoothly performed to coincidence by the shank. Moreover, migration of a slider is smoothly performed because a shank slides the inside of a guide hole. Moreover, by a slider being supported by the guide section by two points, even if it receives the rotation force of a link arm, migration of a slider is performed smoothly.

[0109] Moreover, according to invention according to claim 7, since the configuration of a bend is held and orientation of a bend is disciplinarily performed while the bend of wire harness is protected from interference with the exterior by the coil member, an operation of the bend stated by the effect of the invention according to claim 1 is promoted. Moreover, according to invention according to claim 8, since the curve direction is corrected at the both ends of a bend, an operation of a bend is promoted like claim 7.

[0110] Moreover, according to invention according to claim 9, the man day with a group to the components cost and the slide door of a guide section simple substance is reduced, and the simplification and lightweight-izing of the structure of a

slide door are attained because reinforcing materials serve as the guide section. Moreover, according to invention according to claim 10, since the guide section (guide hole) is formed in the same field as tabular reinforcing materials and does not project from tabular reinforcing materials's front face, space-saving-izing and thin shape-ization of a slide door are attained. Moreover, the sliding friction of a link arm and a slide door is reduced, and the switching action of a link arm makes it smooth because a link arm touches tabular reinforcing materials's wave type part. Moreover, according to invention according to claim 11, since bar-like reinforcing materials can be used as the guide section in a form as it is, processing of a guide hole etc. is unnecessary and much more cost reduction of it becomes possible. Moreover, since bar-like reinforcing materials are excellent in flexural rigidity, there is little bending etc. and migration of a slider is smoothly performed by it.

[0111] Moreover, according to invention according to claim 12, the slide engagement section of a link arm carries out slide migration by the radii-like locus along with the second guide section with migration of a slider at the time of closing motion of a slide door. By this, blurring and with backlash, and vibration are prevented, and interference with the other components by the side of a slide door does not take place, but generating of a blemish and an allophone, such as a link arm, wire harness, and other components, is prevented. [of a pair] [of a link arm] This is the same during car transit. Moreover, according to invention according to claim 13, since neither the guide section nor the second guide section protrudes from a panel, space-saving-izing and thin shape-ization of a slide door are attained. Moreover, the guide section and the second guide section can be made to form by low cost simply by pierced and forming each guide hole in the plate of the inner panel of a slide door, or another object.

[0112] Moreover, according to invention according to claim 14, vibration of a link arm is certainly prevented by having prepared the slide engagement section in the connection section which is the top-most vertices of a big link arm of a deflection most. Moreover, structure is simplified and components mark and components cost are reduced because the connection section serves as the slide engagement section. Moreover, according to invention according to claim 15, blurring and with backlash are prevented much more certainly in the periphery of the guide hole which is the second guide section being engaged between the flanges of a pair, and being located so that it may face across the periphery of a guide hole between the flanges of a pair. [of a pair] [of a link arm] Moreover, according to invention according to claim 16, the slide engagement section containing the flange of a pair can be made engaged simply [a guide hole] and certainly by making the flange by the side of a minor diameter insert in the background of an insertion hole to a guide hole. The slide engagement section to a guide hole escapes from the flange by the side of a minor diameter, it acts as the stop section, and makes crookedness actuation of a link arm perform smoothly.

[0113] Moreover, according to invention according to claim 17, while thin shape-ization of a slide door is attained with a tabular guide rail compared with the guide rail of a solid configuration, processing of a guide hole is easy and the handling of a guide rail is easy. Moreover, compared with the guide section in which the guide hole was formed, it is hard to wear on a panel or a plate out, and advantageous to them also in reinforcement. Moreover, according to invention according to claim 18, since the link arm of a pair opens by self-weight, the reset action of a slide block is performed smoothly and certainly. According to invention according to claim 19, while the ***** activity of the wire harness to a slide door easy-izes with the flexibility of a cabtire cable, and the homogeneity of crookedness, since flexibility is good, the increment in the number of circuits is possible, and it can respond to much auxiliary machinery, and, moreover, terminal treatment for a connector joint is also easy-ized.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] This invention makes the slider which fixed the wire harness by the side of a slide door engage with the guide section free [a slide], and relates to the electric supply structure of the slide door for automobiles which set always constant the connecting location of the wire harness by the side of the slide door at the time of slide door closing motion, and the wire harness by the side of a car body.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] In order to connect to the wire harness by the side of a car body (power-source side) each auxiliary machinery, such as the internal power window motor and internal door-lock unit of the slide door looked at by a one-box car and some passenger cars, and a loudspeaker, through door wire harness, conventionally various means are provided.

[0003] Drawing 22 shows the electric supply structure of the conventional slide door for automobiles indicated by JP,4-124555,U as an example, each auxiliary machinery 102 in a slide door 101 is connected to wire harness 104 through a controller 103, and the terminal of wire harness 104 is connected to one contact 105 of the door front end section. The contact 107 of another side is formed in a car-body 106 side, and the contact 107 is connected to the dc-battery 109 through wire harness 108. The contact 107 by the side of a car body is connected to the contact 105 by the side of a slide door through the traveling contact which is not illustrated for protection against dust and waterproofing.

[0004] However, if it was in the above-mentioned structure, energization was performed only at the time of close [of a slide door 101], and after the door 101 had opened, there was a fault that actuation of auxiliary machinery, such as closing motion of a power window and a loudspeaker, was not performed. Moreover, since it was the so-called double contact to which both the contacts 105,107 are connected through the traveling contact protection against dust and for waterproofing, there was concern that the dependability of the increase of contact resistance and connection fell.

[0005] Moreover, apart from the above-mentioned structure, as electric supply structure (not shown) in the general door for buildings, the arm of two hollow is connected with JP,5-28893,U with a revolving shaft in the air, one arm is fixed to door, the arm of another side is fixed to a building, and the structure of making an electric wire inserting in the interior of an arm is proposed.

[0006] However, although it can respond when a door carries out the switching action of a concentric circle with one shaft, if it is in this structure What [carries out the switching action which is two-dimensional like the slide door of an automobile, and includes curvilinear actuation] It could not apply to what carries out a three-dimensions-switching action, and the problem that structure is enlarged and complicated by hypertrophy of an arm, and an arm tended to make a deflection, an allophone, etc. at the time of closing motion, and there was concern of being hard to perform smooth closing motion.

[0007] On the other hand, the electric supply structure of the slide door for automobiles shown in drawing 23 (a), (b) - drawing 24 (a), and (b) is proposed by JP,7-222274,A. In the structure of drawing 23 (a) and (b), a bearing bar 113 is attached along with the guide rail 112 by the side of the car body 117 to a slide door 111, a bearing bar 113 is looped around the electric wire (wire harness) 114 of a curl configuration, the end side of an electric wire 114 is connected to the loudspeaker 116 of a slide door 111 through a hinge region 115, and the other end side of an electric wire 114 is connected to the audio body by the side of a car body (not shown). Drawing 23 (a) An electric wire 114 is prolonged along with a bearing bar 113 at the time of door close, and it is drawing 23 (b). An electric wire 114 is shrunken at the time of door open, and is contained at it.

[0008] Moreover, in the structure shown in drawing 24 (a) and (b), in connection with the switching action of a slide door 118, the reel 120 which can roll [a delivery and] round round an electric wire (wire harness) 119 is formed in a car-body 121 side, the end side of an electric wire 119 is connected to the loudspeaker 123 by the side of a door through a hinge 122, and the other end side of an electric wire 119 is connected to the audio by the side of a car body (not shown). Drawing 24 (a) It lets out an electric wire 119 from a reel 120 at the time of door close, extends, and is drawing 24 (b). An electric wire 119 is rolled round by the reel 120 at the time of door open.

[0009] However, if it is in the structure of drawing 23 (a) and (b), in order to use the electric wire 114 of the elastic letter of curl, the top which needs the storage space of an electric wire 114 had concern that the continuous-line length of an electric wire 114 became long inevitably, and electric transmission loss became large. When the number of circuits

increases especially or a thick electric wire is used, the diameter of curl will have to be enlarged and continuous-line length will increase further.

[0010] Moreover, if it was in the structure of drawing 24 (a) and (b), according to the die length of an electric wire 119, it rolled round with the count of rolling up of a reel 120, relating with the shaft diameter, when there were few counts of rolling up, the shaft diameter became large, equipment *****ed , and the device in which a twist of an electric wire 119 was prevented also had to be included in the reel 120, and also when the number of circuits increased or a thick electric wire was used, there was a problem that where of equipment *****ed . Moreover, since an electric wire 114,119 is repeatedly crooked in both the structures of drawing 23 (a), (b) - drawing 24 (a), and (b) by the curl volume or the reel volume, while being hard to perform smooth actuation, when it was easy to mourn over the electric wire (circuit section) 114,119 and the number of an electric wire 114,119 was increased, flexibility worsened and there was a problem that it could not respond to connection of the auxiliary machinery of other types.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] While a slider is held by the bend of wire harness in about 1 orientation like the above at the time of the switching operation of a slide door according to invention of claim 1 and five publications, Since attitude actuation of the some of a slider and bending deformation of the wire harness resulting from a three-dimensions-motion of a slide door are permitted and the tensile force and compressive force of wire harness at the time of switching operation are absorbed with the elasticity of a bend, while being able to respond to the rounded switching action in the three dimension: of a slide door easily, the **** load to the bruise and connector of wire harness is prevented. Moreover, since the line length of the wire harness by the side of a slider empty vehicle object, i.e., the line length of a bend, is short and it ends, the electric transmission loss in which wire harness originates in a ***** is reduced.

[0105] Moreover, according to invention according to claim 2, wire harness hangs from a harness support guide to a slider, and since it is the structure which wire harness rocks forward and backward at the time of the switching operation of a slide door, overall depth of a slide door cannot be taken but it can apply to a thin slide door.

[0106] moreover -- since a slider is disciplinarily returned to an orientation by the take-up reel at the time of aperture actuation of a slide door and a restoration operation of the slider by the bend is assisted, while a smooth reset action and orientation-ization of a slider are promoted according to invention according to claim 3 -- wire harness -- flustering -- etc. -- it is stopped and smooth rocking is attained. Moreover, a feeder system consists of easy structures of the guide section, a slider, a harness supporter, and a take-up reel, and structure simplifies and miniaturizes.

[0107] Moreover, since the link arm of a pair expands and contracts (closing motion) and slide actuation of a slider is assisted at the time of the switching operation of a slide door, while according to invention according to claim 4 a slider and wire harness move smoothly relatively to a slide door and orientation-ization of a slider is promoted, the force with wire harness impossible for is not applied between sliders a car-body side, but wire harness is protected. Moreover, since the link arm is supporting wire harness, the wire harness at the time of the switching operation of a slide door is worn, and **, and wire harness's hanging down and the debt at the time of a slide door close by-pass bulb completely are prevented. Moreover, since wire harness is crooked in one with the link arm of a pair at the time of the switching operation of a slide door, crookedness actuation of wire harness is ensured [smoothly and]. Moreover, a feeder system consists of easy structures of the link arm of the guide section, a slider, and a pair, and structure is simplified and miniaturized.

[0108] Moreover, according to invention according to claim 6, rotation (switching action) of a link arm and slide actuation in alignment with the guide section are smoothly performed to coincidence by the shank. Moreover, migration of a slider is smoothly performed because a shank slides the inside of a guide hole. Moreover, by a slider being supported by the guide section by two points, even if it receives the rotation force of a link arm, migration of a slider is performed smoothly.

[0109] Moreover, according to invention according to claim 7, since the configuration of a bend is held and orientation of a bend is disciplinarily performed while the bend of wire harness is protected from interference with the exterior by the coil member, an operation of the bend stated by the effect of the invention according to claim 1 is promoted. Moreover, according to invention according to claim 8, since the curve direction is corrected at the both ends of a bend, an operation of a bend is promoted like claim 7.

[0110] Moreover, according to invention according to claim 9, the man day with a group to the components cost and the slide door of a guide section simple substance is reduced, and the simplification and lightweight-izing of the structure of a slide door are attained because reinforcing materials serve as the guide section. Moreover, according to invention according to claim 10, since the guide section (guide hole) is formed in the same field as tabular reinforcing materials and does not project from tabular reinforcing materials's front face, space-saving-izing and thin shape-ization of a slide door are attained. Moreover, the sliding friction of a link arm and a slide door is reduced, and the switching action of a link arm makes it smooth because a link arm touches tabular reinforcing materials's wave type part. Moreover, according to

invention according to claim 11, since bar-like reinforcing materials can be used as the guide section in a form as it is, processing of a guide hole etc. is unnecessary and much more cost reduction of it becomes possible. Moreover, since bar-like reinforcing materials are excellent in flexural rigidity, there is little bending etc. and migration of a slider is smoothly performed by it.

[0111] Moreover, according to invention according to claim 12, the slide engagement section of a link arm carries out slide migration by the radii-like locus along with the second guide section with migration of a slider at the time of closing motion of a slide door. By this, blurring and with backlash, and vibration are prevented, and interference with the other components by the side of a slide door does not take place, but generating of a blemish and an allophone, such as a link arm, wire harness, and other components, is prevented. [of a pair] [of a link arm] This is the same during car transit. Moreover, according to invention according to claim 13, since neither the guide section nor the second guide section protrudes from a panel, space-saving-izing and thin shape-ization of a slide door are attained. Moreover, the guide section and the second guide section can be made to form by low cost simply by pierced and forming each guide hole in the plate of the inner panel of a slide door, or another object.

[0112] Moreover, according to invention according to claim 14, vibration of a link arm is certainly prevented by having prepared the slide engagement section in the connection section which is the top-most vertices of a big link arm of a deflection most. Moreover, structure is simplified and components mark and components cost are reduced because the connection section serves as the slide engagement section. Moreover, according to invention according to claim 15, blurring and with backlash are prevented much more certainly in the periphery of the guide hole which is the second guide section being engaged between the flanges of a pair, and being located so that it may face across the periphery of a guide hole between the flanges of a pair. [of a pair] [of a link arm] Moreover, according to invention according to claim 16, the slide engagement section containing the flange of a pair can be made engaged simply [a guide hole] and certainly by making the flange by the side of a minor diameter insert in the background of an insertion hole to a guide hole. The slide engagement section to a guide hole escapes from the flange by the side of a minor diameter, it acts as the stop section, and makes crookedness actuation of a link arm perform smoothly.

[0113] Moreover, according to invention according to claim 17, while thin shape-ization of a slide door is attained with a tabular guide rail compared with the guide rail of a solid configuration, processing of a guide hole is easy and the handling of a guide rail is easy. Moreover, compared with the guide section in which the guide hole was formed, it is hard to wear on a panel or a plate out, and advantageous to them also in reinforcement. Moreover, according to invention according to claim 18, since the link arm of a pair opens by self-weight, the reset action of a slide block is performed smoothly and certainly. According to invention according to claim 19, while the **** activity of the wire harness to a slide door easy-izes with the flexibility of a cabtire cable, and the homogeneity of crookedness, since flexibility is good, the increment in the number of circuits is possible, and it can respond to much auxiliary machinery, and, moreover, terminal treatment for a connector joint is also easy-ized.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] This invention, without being intermittent in a contact in view of the trouble in each above-mentioned conventional structure While reducing the electric transmission loss in which it can respond to the rounded switching action in the three dimensions of a slide door easily, and wire harness originates in a ***** The complication and hypertrophy of structure (equipment), and a raise in cost which can cancel the trouble resulting from repeat crookedness of wire harness, and originate in a curl volume, a reel volume, etc. of wiring in an arm or an arm or wire harness, and aggravation of operability can be prevented. Faults, such as the deflection and allophone at the time of being able to apply to a thin slide door and using an arm, and badness of a motion, can also be prevented. Moreover, even if it increases the number of circuits, the flexibility of wire harness is good, can respond to much auxiliary machinery, and aims to let **** and terminal treatment of wire harness offer the electric supply structure of the easy slide door for automobiles.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention prepares the guide section of the slide door closing motion direction in a slide door, and is made to engage a slider with this guide section, enabling free slide, the wire harness by the side of a slide door is fixed to this slider, and the electric supply structure of the slide door for automobiles characterized by forming a bend in this wire harness between this slider and a car-body side is adopted (claim 1). It is also effective to have prepared the harness support guide in said slide door [above said guide section], to have applied to said slider from this harness support guide, and to have hung said wire harness (claim 2). Moreover, it is also effective to have had the take-up reel which energizes said slider in the direction of slide door closing (claim 3). Moreover, prepare the guide section of the slide door closing motion direction in a slide door, make a slider engage with this guide section, enabling a free slide, connect the end side of the link arm of the pair connected with this slider, the other-end side of the link arm of this pair is made to support to revolve to this slide door side, and the electric-supply structure of the slide door for automobiles characterized by ****(ing) wire harness is collectively adopted as this slider from the link arm of this pair (claim 4). It is also effective in said wire harness between said slider and a car-body side to have formed the bend (claim 5). Moreover, having connected with said slider by the shank and having been engaged free [the slide to the guide hole of said guide section] for this shank also has the effective end side of the link arm of said pair (claim 6). Moreover, it is also effective that the coil member was extrapolated by the bend of said wire harness (claim 7). It is also effective that said coil member has been arranged to the both ends of said bend (claim 8). Moreover, it is also effective that said guide section was constituted by the reinforcing materials of said slide door (claim 9). Said reinforcing materials are **** type tabular reinforcing materials, and it is also effective that the guide hole as said guide section was formed in this tabular reinforcing materials (claim 10). It is effective that said reinforcing materials are also bar-like reinforcing materials (claim 11). moreover, said slide door side -- the second radii-like guide section -- preparing -- this -- it is effective to also have made the slide engagement section of the link arm of said pair engage with the second guide section, enabling a free slide (claim 12). Moreover, it is also effective that each guide hole as said guide section and said second guide section was formed in the inner panel or the plate (claim 13). Moreover, it is also effective that said slide engagement section was prepared in the connection section of the link arm of said pair (claim 14). Moreover, it is also effective that the periphery of the guide hole as said second guide section was engaged between the flanges of this pair including the flange which a pair counters [said slide engagement section] (claim 15). one side of the flange of said pair -- a minor diameter -- and it is also effective that it was formed in the major diameter, and the insertion hole to one [this] flange was opened for free passage and prepared in the edge of this guide hole rather than the guide hole which is said second guide section (claim 16). Moreover, said guide section of it being a guide rail tabular [long] is also effective (claim 17). Moreover, it is also effective that the link arm of said pair has been arranged upward to said guide section (claim 18). Moreover, it is effective that said wire harness is also a cabtire cable (claim 19).

[0013]

[Embodiment of the Invention] The example of the gestalt of operation of this invention is explained at a detail using a drawing below. Drawing 1 - drawing 9 show the first operation gestalt of the electric supply structure (equipment) of the slide door for automobiles concerning this invention.

[0014] The guide rail (guide section) 3 horizontal to the lower part side of the inner panel 2 of a slide door 1 like drawing 1 is formed. A slide block (slider) 4 engages with a guide rail 3 free [a slide]. And a slide block 4 is pulled by the take-up reel 5 in the back of a door aperture, i.e., the direction. The pars intermedia of the wire harness 6 by the side of a door is fixed to a slide block 4. One side of wire harness 6 is supported by the guide idler (guide section) 7, and another side of wire harness 6 is crooked in the shape of abbreviation for U characters, and is connected with the wire harness 9 by the side of a car body by connectors 10 and 11 at the car-body 8 side (dc-battery side). In this book, the car travelling direction is appointed at the front.

[0015] The feeder system A of the slide door for automobiles of this example consists of the guide rail 3, a slide block 4, a take-up reel 5, and a guide idler 7. A take-up reel 5 is fixed to the inner panel 2 of a slide door 1 in the back of a guide rail 3, and the guide idler 7 is attached free [rotation] in the height direction pars intermedia of the inner panel 2. Each connectors 10 and 11 of the wire harness 6 and 9 by the side of a door and a car body are being fixed inside the vertical wall 13 of the step section 12 of a car body 8. The slide door 1 is engaging with the lower limit side with the hinge roller 14 free [a slide on the rail 15 (drawing 7) by the side of a car body].

[0016] a guide rail 3 -- truth -- the slit (long hole)-like guide hole 17 is formed in direct band-like Itabe's 16 center of the height direction, and fixed parts 18-20 are formed in Itabe's 16 both ends and longitudinal direction pars intermedia, it grows into them, and each fixed parts 18-20 are being fixed to the inner panel 2 with the bolt 22 through the ring-like spacer 21. Between the inner panel 2 and the guide rail 3, the clearance 23 for board thickness between spacers 21 is constituted. The shank (pivot) 24 of a slide block 4 penetrates to the guide hole 17 of a guide rail 3, and it engages with it, for example, the flange (not shown) at the tip of a shank 24 is located in the clearance 23 between the backgrounds of a guide rail 3. Bearing (not shown) is prepared in the periphery of a shank 24, and a slide block 4 moves smoothly horizontally along with the long hole-like guide hole 17 because bearing ****s to the guide hole 17.

[0017] The take-up reel 5 has the spring means (not shown) for rolling round a wire 26 inside the body 25 of a reel, and the wire 26 extended from the nozzle 27 is always energized in the **** direction. The tip of a wire 26 is connected with the back end of a slide block 4. The slide block 4 is always back energized by it. In case a take-up reel 5 closes a slide door 1, it is for making a slide block 4 easy to move back (migration being assisted). The tensile force by the take-up reel 5 is a thing of extent which stretches the wire harness 6 by the side of a door with the pin.

[0018] Moreover, a guide idler (harness support guide) 7 consists of rollers 29 of a pulley-like fluting which can rotate freely through bearing in the surroundings of the shank 28 fixed to inner PANARU 2 in the upper part of a guide rail 3, and a shank 28. The wire harness 6 by the side of a door begins to separate into the cross-section semicircle-like slot 30, and it is engaging with it that there is nothing. In addition, it is also possible to use the guide shaft (harness support guide) which replaces with the guide idler 7 which can be rotated freely, and fixed does not illustrate. It cannot be overemphasized that the same slot 30 as a guide shaft is formed.

[0019] The wire harness 6 by the side of a door is in the condition hung from the guide idler 7, and is rocked by migration of a slide block 4. The point side of wire harness 6 is horizontally prolonged in a distance short ahead of a guide idler 7, and is connected to the connector of the wire harness of auxiliary machinery called the power window motor, door lock, and loudspeaker inside a slide door which are not illustrated by the connector 31 by the side of the tip of wire harness 6. The connector 31 is being fixed to the inner panel 2.

[0020] The lower part of the wire harness 6 which continues to the slide-block 4 empty-vehicle object 8 side curves in the shape of abbreviation for U characters towards the front, and follows the wire harness 9 by the side of the car body which is a power-source line through connectors 10 and 11 through this bend 38 like the above-mentioned. The wire harness 9 by the side of a car body continues to the front (dc-battery side) in accordance with the inside of the wall of step 12. For example, it is a male, and one connector 10 has a receptacle (not shown) inside connector housing made of synthetic resin (a sign 10 is substituted), and the connector 11 of another side is a female mold, and it has the male terminal (not shown) inside connector housing (a sign 11 is substituted).

[0021] A slide block 4 is formed in the shape of a rectangle, has the step 32 by which notching was carried out in the center of a longitudinal direction, and is made to project like drawing 2 in the condition of having curved the wire harness 5 by the side of a door ahead of the step 32. The second half section of a slide block 4 is formed heavy-gage, and it is fixed so that the polymerization of the pressure plate 34 may be made to carry out in the direction of board thickness of a heavy-gage part 33 and wire harness 6 may be inserted. Bulge formation of the arch section 35 which curved at about 90 degrees is carried out at a pressure plate 34, the slot 36 corresponding to the arch section 35 is formed in a heavy-gage part 33, a pressure plate 34 is fixed to a heavy-gage part 33 with a machine screw 37, and wire harness 6 is pinched between a slot 36 and the arch section 35.

[0022] It is equipped so that a coil spring (coil member) 39 may be twisted around the periphery of the bend 38 of the shape of U character of the wire harness 6 by the side of a door between a slide block 4 and a connector 10. while a coil spring 39 orients the bend 38 of wire harness 6 -- a bend 38 -- rubbing -- etc. -- from -- it protects. Orientation of a bend 38 is for maintaining a bend 38 at the condition of having been crooked gently (setting right), preventing bending, flapping, etc. of a bend 38 accompanying migration of a slide block 4, and preventing breakage of wire harness 6.

[0023] The spring force contacts the step 32 of a slide block 4, and the fitting side of a connector 10 by pressing at end-face 10a of the opposite side, and the both ends of a coil spring 39 separate from a step 32 or end-face 10a, and do not slip down. It is possible to also make the both ends of a coil spring 39 fix to a slide block 4 and a connector 10 with a stop means (not shown). It is possible to set the bore of a coil spring 39 as less than [the outer diameter of wire harness 6, an

EQC, or it], and to also make it stick to the peripheral face of wire harness 6.

[0024] Like drawing 3 , it is also possible to limit in the bend 38 of the wire harness 6 by the side of a door to two by the side of a slide block 4 and a connector 10, and to extrapolate coil springs (coil member) 40 and 41 partially. Adhesion immobilization of the tip of coil springs 40 and 41 is carried out at the step 32 of a slide block 4, and end-face 10a of a connector 10. It is also possible to stick the bore of coil springs 40 and 41 on the periphery of a bend 38 like the example of drawing 2 . Since the both ends of a bend 38 are oriented by coil springs 40 and 41, also by migration of a slide block 4, a bend 38 maintains a U character configuration and always does so the same effectiveness as the example of drawing 2 .

[0025] Like drawing 4 , the cabtire cable is used as wire harness 6 of this example. A cabtire cable is JIS. Arrange two or more electric wires 42-43 inside, it is filled up with the insulators 44, such as polyethylene foam, among two or more electric wires 42-43, the outside of an insulator 44 is made to put the vinyl insulation sheath 45, and two kinds of electric wires 42 and 43 with which sizes differ are made to insert in in this example, as shown also in C3327.

[0026] By using a cabtire cable as wire harness 6, the wire harness 6 of a perfect cross-section circle configuration can be obtained. Since it is uniform, without the flexibility of wire harness 6 being different with the crookedness direction, while a **** activity until it carries out a connector joint through a slide block 4 from the guide idler 7 of drawing 1 easy-izes The configuration holdout in a bend 38 is good, and cutting of the wire harness 6 at the time of moreover attaching a connector 10, peeling, and terminal treatment called terminal sticking by pressure are also easy.

[0027] Like drawing 5 , in the state of closing of a slide door 1, the slide block 4 was pulled by the wire 26 of a take-up reel 5, and was located in the back end section of a guide rail 3, and the wire harness 6 by the side of a door inclined and started ahead from the slide block 4, was supported by the guide idler 7, and is prolonged to the front connector 31. The shank 24 (drawing 1) of a slide block 4 is located in near at the back end in contact with the back end of the guide hole 17 of a guide rail 3. By the slide block 4 being pulled with the take-up reel 5, migration of the slide block 4 under car transit is prevented, and wear, an allophone, etc. accompanying slack or slack of the wire harness 6 by the side of a door are prevented.

[0028] From the slide block 4, the bend 38 (refer to drawing 1) of wire harness 6 is extended to the car-body side. The bend 38 (drawing 1) is being fixed by the connector joint in the step section 12 of a car body 8. As for a connector and 46, 10 is [a windowpane and 47] handles in drawing 5 .

[0029] Since the bend 38 of wire harness is connected with the car-body side like drawing 6 , in the state of the aperture of a slide door 1, a slide block 4 moves to the front end section of a guide rail 3, and is located. It means that a slide block 4 is in the almost same location as the closing condition of the slide door 1 of drawing 5 , and a slide door 1 leaves a slide block 4, and had retreated correctly. Although the wire 26 of a take-up reel 5 was lengthened and the slide block 4 is pulled back, the slide block 4 is stopped by the holding power of the bend 38 of wire harness 6 to the front.

[0030] In case a take-up reel 5 closes a slide door 1 in the direction of arrow-head I like drawing 5 , it assists a slide block 4 and back is made it to carry out slide migration smoothly. Although wire harness 6 is rocked between a guide idler 7 and a slide block 4 at the time of closing motion of a slide door 1, a guide idler 7 supports the wire harness 6 at the time of rocking by low frictional force, and makes crookedness actuation of the wire harness 6 in alignment with the periphery of a guide idler 7 perform smoothly. Although wire harness 6 produces slack at the time of rocking, it is also possible to prepare the slack absorber style (not shown) which pulls the rocking section 48 of wire harness 6 to the front thru/or back

[0031] Like drawing 7 , a slide door 1 is located in the same field as the lateral surface of a car body 8 in the state of closing of a slide door 1. The hinge roller 14 by the side of the lower limit of a slide door 1 is located in the front end of ramp 15a by the side of before a rail 15. The bend 38 of the wire harness 6 (drawing 1) by the side of a door is crooked in the shape of [in which the root narrowed in the top view] abbreviation for U characters, and is located in the back end side of a slide door 1.

[0032] Like drawing 8 , a slide door 1 projects outside greatly in accordance with the crookedness configuration of a rail 15 in the middle of the aperture of a slide door 1. A slide block 4 (drawing 6) is located in the middle of the guide rail 3 (drawing 6) of a slide door 1, and the bend 38 of wire harness 6 (drawing 1) is opened greatly broadly, and is crooked in the shape of abbreviation for U characters. The hinge roller 14 moves along with true straight-part 15b from ramp 15a of a rail 15.

[0033] Like drawing 9 , in the aperture condition of a slide door 1, a slide door 1 is located in parallel along with the lateral surface of a car body 8, and the hinge roller 14 is located in the back end side of true straight-part 15b of a rail 15. A slide block 4 (drawing 6) is located in the front end side of a slide door 1, and the bend 38 of wire harness 6 (drawing 1) presents the letter of the abbreviation for U characters which was pulled a little back and inclined.

[0034] According to this operation gestalt, it can respond to the rounded switching action in the three dimensions of a

slide door 1 smoothly by having formed the bend 38 in the wire harness 6 (cable) by the side of a door. Moreover, the wire harness 6 by the side of a door is hung from the central upper part of a slide door 1, and since it is the easy device in which it justifies by the slide block 4 connected with the take-up reel 5, overall depth (dimension of the thickness direction of a door) can be made small, and it can apply to the thin slide door 1. Moreover, since the cable was adopted as wire harness 6 by the side of a door, **** and terminal treatment are easy.

[0035] Moreover, since it is the structure which binds the pressure plate 34 of a slide block 4 tight with a machine screw 37, and fixes the wire harness 6 by the side of a door, the desorption activity of wire harness 6 is easy, and assemblability and maintenance nature are good. Moreover, since it applied to the slide-block 4 empty-vehicle object side and the wire harness 6 by the side of a door was incurvated in the shape of U character, while crookedness actuation of the wire harness 6 at the time of slide door closing motion is smoothly performed in a bend 38, expansion and contraction and tensile force of wire harness 6 are absorbed by the elasticity of a bend 38, and the bruise of wire harness 6 is prevented with it. by extrapolating especially the coil springs 39-41 to a bend 38, while a bend 38 is protected from interference with the exterior, configuration maintenance of a bend 38 is performed positively, and expansion and contraction of wire harness 6 and the absorption effect of tensile force are promoted, and a slide block 4 holds to predetermined [on a guide rail 3] in a location at the time of slide door closing motion -- having -- the rocking section 48 (drawing 5) of wire harness 6 -- flustering -- etc. -- an unnecessary motion is prevented. Moreover, unnecessary attitude actuation of a slide block 4 is prevented by the take-up reel 5 at the time of slide door closing motion, a slide block 4 is held in a location predetermined [on a guide rail 3], and the same effectiveness as the above is done so.

[0036] Drawing 10 - drawing 15 show the second operation gestalt of the electric supply structure (equipment) of the slide door for automobiles concerning this invention. The feeder system B of the slide door for automobiles of this example loses the take-up reel 5 (drawing 1) of a precedent, forms it for two link arms (pair) 52 and 53 in a guide rail (guide section) 51, enabling free closing motion, **** the wire harness 54 by the side of a door along with two link arms 52 and 53, and is made to expand and contract it by the switching action of two link arms 52 and 53 like drawing 10 .

[0037] The guide rail 51 horizontal to the lower part of the inner panel 2 of a slide door 1 is fixed like a precedent, and the slide block (slider) 56 is engaging with the guide hole 55 of the long hole configuration of a guide rail 51 free [a slide]. The end section of the first link arm 52 is connected with the slide block 56 free [rotation] through the shank 57 (drawing 11). The end section of the second link arm 53 is connected with the front end section of a guide rail 51 free [rotation] through a shank 58 (drawing 11), and the other end of the first link arm 52 and the other end of the second link arm 53 are connected with the revolving shaft 59. Both the links arms 52 and 53 stand up upward in the shape of reverse V character. Other configurations are the same as that of the first operation gestalt in general. The feeder system E of the slide door for automobiles of this example consists of a guide rail 51, a slide block 56, and two link arms 52 and 53

[0038] a precedent -- the same -- a guide rail 51 -- truth -- the slit-like guide hole 55 is formed in direct band-like Itabe's 60 center of the height direction, and fixed parts 62-64 are formed in Itabe's 60 both ends and longitudinal direction parts intermedia, it grows into them, and each fixed parts 62-64 are fixed to the inner panel 2 with a bolt 66 through the ring-like spacer 65. Between the inner panel 2 and the guide rail 51, the clearance 67 for board thickness between spacers 65 is constituted.

[0039] The shank (pivot) 68 of a slide block 56 penetrates and engages with the guide hole 55 of a guide rail 51, and the flange 69 (drawing 13) at the tip of a shank 68 is located in the clearance 67 between the backgrounds of a guide rail 51. A shank 68 can be freely rotated by bearing 70 (drawing 13), and a slide block 56 moves smoothly horizontally along with the guide hole 55 by it.

[0040] Moreover, on the background of a guide rail 51, the end section of the first link arm 52 is connected with the first portion (thin-walled part) 72 of a slide block 56 by the shank 71 (refer to drawing 12 and drawing 13). The end section of the first link arm 52 is located in said clearance 67, and moves to a slide block 56 and one along the rear face of a guide rail 51.

[0041] The other end of the second link arm 53 is connected with the other end of the first link arm 52 by the shank 59, where a lap is carried out. The end section of the second link arm 53 is connected with the background of the fixed part 6 by the side of the tip of a guide rail 51 free [rotation] by the shank 73. The end section of the second link arm 53 is also located in a clearance 67. The connection structure of these links arms 52 and 53 is later mentioned by drawing 12 - drawing 13 .

[0042] In drawing 10 , the wire harness 54 by the side of a door is ****(ed) in the shape of abbreviation reverse V character along each front face of the first link arm 52 and the second link arm 53 from a slide block 56, is turned up in the shape of U character from the lower limit side of the second link arm 53, and the connector joint is carried out to the wire harness by the side of the auxiliary machinery in a slide door 1 (not shown). Wire harness 54 is being fixed to each

link arms 52 and 53 with the band clip which is not illustrated. In the both sides of wire harness 54, two or more pairs of holes 74 for immobilization are formed in each link arms 52 and 53. Wire harness 54 has some extra length in the upper part of a shank 59.

[0043] Both the links arms 52 and 53 open and close forward and backward (telescopic motion), and wire harness 54 expands and contracts in the link arms 52 and 53 and one with migration of a slide block 56. When the incorporation path of the wire harness 54 within a slide door 1 is on the both-ends side of a slide door 1 at the same time it assists migration of a slide block 56, both the links arms 52 and 53 are involved with hanging-down prevention of wire harness 54, and bearing prevention. The same work as the take-up reel 5 (drawing 1) of a precedent is carried out in that retreat actuation of a slide block 56 is assisted.

[0044] It is an indispensable condition to be arranged so that both the links arms 52 and 53 may be arranged above a guide rail 51 and it may open in the shape of reverse V character, the self-weight of the link arms 52 and 53 becomes easy to open the link arms 52 and 53, and retreat actuation of a slide block 67 is ensured by the big force. Both the links arms 52 and 53 become gradually large from the condition halfway opened in the shape of reverse V character like drawing 10 , and the force of retreating a slide block 56 with the link arms 52 and 53 is certainly pushed aside by the slide block 56 to the back end side of a guide rail 51 at the time of full open of a slide door 1.

[0045] As a continuous line shows, both the links arms 52 and 53 are closed completely, stand up at right angles to facing up, and like drawing 12 , they open both the links arms 52 and 53 in the shape of [of HE] a character like the chain line in the state of the close by-pass bulb completely of a slide door 1 in the state of full open of a slide door 1 (drawing 10). If both the links arms 52 and 53 are horizontally expanded in a straight line in the state of the close by-pass bulb completely of a slide door 1, since both the links arms 52 and 53 lock and a slide door 1 (drawing 10) stops opening, it is necessary to make 53 hold in the shape of [of both the links arms 52 and HE] a character in the state of the close by-pass bulb completely of a slide door 1. Since it opens in the shape of [of both the links arms 52 and 53 HE] a character and the slide block 56 is back pressed in the state of the close by-pass bulb completely of a slide door 1 as it is also by self-weight migration of the slide block 56 under car transit is prevented, and wear, an allophone, etc. accompanying slack or slack of the wire harness 54 (drawing 10) by the side of a door are prevented.

[0046] In case both the links arms 52 and 53 close, it opens from a condition and it shifts to a condition, the shank 59 of the center which connects both the links arms 52 and 53 draws a radii-like locus, and moves. The switching action of both the links arms 52 and 53 is performed because a slide block 56 moves along with a guide rail 51, and a slide block 56 is maintained at the almost same location by the bend 75 of wire harness 54 (drawing 10).

[0047] Like the above-mentioned, the end section of the first link arm 52 is connected with the thin-walled part 72 in the first half of a slide block 56 by the shank 71, and the end section of the second link arm 53 is connected with the fixed part 62 by the side of before a guide rail 51 by the shank 73. A fixed part 62 projects more nearly up than the horizontal guide hole 55, and is located, and the shank 73 is located above the front end of the guide hole 55. The shank 71 of the first link arm 52 penetrates the guide hole 55, it is located, and the second link arm 52 is formed a little shorter than the first link arm 52. Thereby, it is easy to close and the first link arm 52 has become being easy to open. The bolt insertion holes 76-78 are formed in the fixed parts 62 and 63 of the both sides of a guide rail 51, and the fixed part 64 of longitudinal direction middle.

[0048] Like drawing 13 , from inner PANARU 2 of a slide door 1, a guide rail 51 opens the clearance 67 for spacer 65 minutes, and counters, and one edge each of the first link arm 52 and the second link arm 53 is located in a clearance 67. The slide block 56 is engaging with the guide hole 55 of a guide rail 51 free [a slide] by the shanks 68, such as a pin and a bolt. Bearing 70 is formed in the guide hole 55 at the periphery of a shank 68, slide resistance is reduced, a flange 69 thrusts, and is fixed at the tip of a shank 68 by bearing 70, and positioning maintenance of the slide block 56 is carried out by the flange 69 at the guide rail 51.

[0049] Moreover, penetrate the thin-walled part 72 in the first half of a slide block 56, the guide hole 55 of a guide rail 51 and the end section of the first link arm 52, and a shank 71 is formed. Flanges 79 and 80 are formed in the both ends of a shank 71, and bearing 81 is formed in the periphery of a shank 71 in the guide hole 55 and the end section, respectively. A shank 71 slides on the inside of the guide hole 55 by the low force by each bearing 81, and the first link arm 52 rotates the surroundings of a shank 71 smoothly. A slide block 56 carries out slide migration of the inside of the guide hole 55 by two shanks 68 and the shank 71 approximately at stability.

[0050] Moreover, the other end of the first link arm 52 and the other end of the second link arm 53 are penetrated, a shank 59 is formed, flanges 82 and 83 are formed in the both ends of a shank 59, bearing 84 is formed in the periphery of a shank 59, and both the links arms 52 and 53 are smoothly rotated by bearing 84.

[0051] Moreover, it is arranged through the annular spacer 85 on the background of a fixed part 62, and the end section and a spacer 85 are penetrated, the shank 73 which is a bolt is formed, bearing 86 is formed in the periphery of a shank 73

in the end section, and the second link arm 53 rotates the end section of the second link arm 53 smoothly by bearing 86. The shank 73 is thrust into the inner panel 2 through the flange 87.

[0052] In drawing 10, the lower part of the wire harness 54 which continues to the slide-block 56 empty-vehicle object 8 side curves in the shape of abbreviation for U characters towards the front, and the bend 75 follows the wire harness 9 by the side of the car body which is a power-source line through connectors 88 and 11. The wire harness 9 by the side of a car body continues to the front (dc-battery side) in accordance with the inside of the wall of the step section 12.

[0053] Like drawing 14, the slide block 56 was formed in the shape of a rectangle, countered the flange 80 following the shank 71 ahead of [52] the central step 89 (i.e., the first link arm), and the bend 75 of wire harness 54 has projected it. Like a precedent, the second half section of a slide block 56 is formed heavy-gage, and it is fixed so that the polymerization of the pressure plate 91 may be made to carry out in the direction of board thickness of a heavy-gage part 90 and wire harness may be inserted. Bulge formation of the arch section 92 which curved at about 90 degrees is carried out at a pressure plate 91, the slot 93 corresponding to the arch section 92 is formed in a heavy-gage part 90, a pressure plate 91 is fixed to a heavy-gage part 90 with a machine screw 94, and wire harness 54 is pinched between a slot 93 and the arch section 92.

[0054] Like the precedent, it is equipped so that a coil spring (coil member) 95 may be twisted around the periphery of the bend 75 of the shape of U character of the wire harness 54 by the side of a door between a slide block 56 and a connector 88. while a coil spring 95 orients the bend 75 of wire harness 54 -- a bend 75 -- rubbing -- etc. -- from -- it protects. The both ends of a coil spring 95 are contacted by pressing according to the spring force in the step 89 of a slide block 56, and end-face 88a of a connector 88.

[0055] Like drawing 15, it is also possible to limit in the bend 75 of the wire harness 54 by the side of a door to two by the side of a slide block 56 and a connector 88, and to arrange coil springs 96 and 97 (coil member) partially. Adhesion immobilization of the edge of each coil springs 96 and 97 is carried out at the step 89 of a slide block 56, and end-face 88: of a connector 88. Although the same is said of drawing 14, it is also possible to stick the bore of coil springs 96 and 97 on the periphery of a bend 75. Since the both ends of a bend 75 are oriented by coil springs 96 and 97, a bend 75 always maintains a U character configuration also by migration of a slide block 56.

[0056] The cabtire cable is used as wire harness 54 like the first operation gestalt (refer to drawing 4). Since flexibility is uniform, while the wire harness 54 of a perfect cross-section circle configuration can be obtained by using a cabtire cable, and the **** activity to both the links arms 52 and 53 and a **** activity until it makes it curve from a slide block 56 and makes it connect with the connector 11 of the wire harness 9 by the side of a car easy-ize, the configuration holdout in a bend 75 is good, and the terminal treatment at the time of moreover attaching a connector 88 is also easy.

[0057] In drawing 10, each connectors 88 and 11 of the wire harness 54 and 9 by the side of a door and a car body are being fixed inside the vertical wall 13 of the step section 12. The slide door 1 is engaging with the lower limit side with the hinge roller 14 free [a slide on the rail 15 (drawing 7) by the side of a car body]. Since the bend 75 of wire harness 54 is supported by the connector joint by the car-body side like the precedent, a slide block 56 moves to the front end section of a guide rail 51 at the time of the aperture of a slide door 1. Correctly, a slide door 1 leaves a slide block 56, and retreats.

[0058] The operation shown in drawing 7 of the first operation gestalt - drawing 9 shall be the same also in this operation gestalt, and shall read the sign 38 of the bend in drawing 7 - drawing 9 as a sign 75. That is, a slide door 1 is located in the same field as the lateral surface of a car body 8 in the closing condition of the slide door 1 of drawing 7. The hinge roller 14 by the side of the lower limit of a slide door 1 is located in the front end of ramp 15a by the side of before a rail 15. The bend 75 of the wire harness 54 (drawing 10) by the side of a door is crooked in the shape of [in which origin narrowed in the top view] abbreviation for U characters, and is located in the back end side of a slide door 1.

[0059] A slide door 1 projects outside greatly in accordance with the crookedness configuration of a rail 15 in the middle of the aperture of the slide door 1 of drawing 8. A slide block 56 (drawing 10) is located in the middle of a slide door 1, and the bend 54 of wire harness 54 (drawing 10) is opened greatly broadly, and is crooked in the shape of abbreviation for U characters. The hinge roller 14 moves along with true straight-part 15b from ramp 15a of a rail 15.

[0060] In the aperture condition of drawing 9 and a slide door 1, a slide door 1 is located in parallel along the side face of a car body 8, and the hinge roller 14 is located in the back end side of true straight-part 15b of a rail 15. A slide block 56 (drawing 10) is located in the front end side of a slide door 1, and the bend 75 of wire harness 54 (drawing 10) presents the letter of the abbreviation for U characters which was pulled a little back and inclined.

[0061] According to the operation gestalt of the above second, since it is the easy structure where wire harness 54 was mated and attached in a slide block 56 and the link arms 52 and 53, overall depth can be made small and it can apply to the thin slide door 1. Moreover, since wire harness 54 was supported using the link arms 52 and 53 of a pair, on the inner panel 2, neither wire harness's 54 hanging down [slack or] at the time of closing motion of a slide door 1, nor a debt

takes place, and, it is not worn [wire harness 54 contacts, and] out, and wire harness 54 is protected certainly. Moreover, since a slide block 56 is certainly returned to a position in the retreat actuation by the self-weight of the link arms 52 and 53 at the time of closing of a slide door 1, impossible **** of the bend 75 by the return delay of wire harness 54, i.e., the **** load to a connector 88, is prevented.

[0062] Moreover, since it could respond to the rounded switching action in the three dimensions of a slide door 1 smoothly and the cable was used as wire harness 54 by the side of a door by the bend 75 of wire harness 54 like said gestalt, **** and terminal treatment are easy. Moreover, it is the same as that of said gestalt that there are protection of the improvement in the attachment-and-detachment workability of wire harness 54, smooth-izing of crookedness actuation of the wire harness 54 by the bend 75 and the expansion and contraction of wire harness 54 by the pressure plate 91 of a slide block 56, the absorption of tensile force, and the bend 75 by coil springs 95-97 and a configuration maintenance operation.

[0063] In addition, although each above-mentioned operation gestalt showed the structure of having formed guide rails 3 and 51 and moving the wire harness 6 and 54 by the side of a door to a slide door side by slide blocks 4 and 56 and one Prepare a guide rail in a car-body side, and the wire harness by the side of a car body is fixed to the slide block which engaged with the guide rail. It is also possible to consider as the structure which carries out a connector joint to the wire harness by the side of a door through the bend of the shape of U character of the wire harness by the side of a car body, in this case, the slide door 1 of drawing 1 shall be read as a car body, and a car body 8 shall be read as a slide door.

[0064] Drawing 16 shows the third operation gestalt of the electric supply structure of the slide door for automobiles concerning this invention. This structure supports to revolve the end side of the link arm 125,126 which the pair connected to a slide door 127 side, uses it as the guide rail (guide section) with which a slide block 128 is made to engage free [a horizontal slide] in the structure which connected the other-end side with the slide block (slider) 128, and is characterized by to form the guide hole 130 which is a long hole of the shape of a slit horizontal to the tabular reinforcing materials 129 using the tabular reinforcing materials 129 who are reinforcement members for the cure against a side collision.

[0065] The guide rail in said second operation gestalt is abolished, and components mark and components cost are reduced by having considered as instead of [of a guide rail] using the tabular reinforcing materials 129 for the existing cure against a side collision, and the man day with a group in a guide-rail simple substance is reduced. Moreover, the weight of a part without a guide rail and a slide door 127 is mitigated.

[0066] The tabular reinforcing materials 129 are formed in the shape of a wave type, and the slit-like guide hole 130 is formed in the flat part 132 of the ***** 131 bottom. ***** 131 followed each **** 133 of the shape of a character to abbreviation which followed juxtaposition by two thru/or the number beyond it in the vertical direction, and each **** 133 of a top and the bottom -- a half -- Yamabe -- it consists of 134. a lower half -- Yamabe -- said flat part 132 of the width of face of a flat part 132 is almost equal to one width of face of Yamabe 133 following 134. the front face of a flat part 132, and top-most-vertices 133a of each **** 133 -- the almost same height (height of the slide door thickness direction) -- being located -- top-most-vertices 133a of each **** 133 -- said guide hole 130 -- the same -- horizontal -- parallel -- being located -- top-most-vertices 133a of each **** 133, and an upper half -- Yamabe -- the rear face of the link arm 125,126 of a pair can carry out line contact, and can **** on the top-most vertices of 134 by the small sliding friction.

[0067] Originally, although it is for raising the tabular reinforcing materials's 129 rigidity, also in order for ***** 131 to reduce a touch area with the link arm 125,126 of a pair and to make the switching action of the link arm 125,126 perform smoothly, it is effective. Whether it is a little lower than the die length (height of the vertical direction) of the link arm 125,126 just before stopping mostly like drawing 16 or the width of face of the tabular reinforcing materials's 129 vertical direction is high, it is not cared about. the tabular reinforcing materials 129 are comparable as full [of a slide door 127] - it is -- carrying out -- it is a little short and the flat part 135 with a narrow trough is being fixed to the inner panel 137 of a slide door 127 with the fixed means of bolt 136 grade.

[0068] Front end section 126a of the link arm 126 by the side of before is supported by the flat part 132 of the tabular reinforcing materials 129 bottom free [rotation] by the shanks 138, such as a bolt. The shank 138 is located a little in the front end bottom of the guide hole 130. although the same is said of said second operation gestalt, it is that the shank 138 by the side of before is located in the latest of a guide rail or the slit-like guide hole 130, and the switching action of the link arm 125,126 is small -- it is carried out smoothly.

[0069] Like the second operation gestalt, the link arm 125,126 of a pair is connected by the central shank 139, and back end section 125a of the link arm 125 on the backside is supported by the slide block 128 free [rotation] by the shank 140 **** immobilization is carried out along with the link arm 125,126 of a pair, and wire harness 141 is ****(ed) upward along with top-most-vertices 133a of each **** 133 of the tabular reinforcing materials 129 from the front end side of the

link arm 126 by the side of before, and is connected to an electric equipment article, auxiliary machinery, etc. in a slide door 127. Since wire harness 141 touches mostly top-most-vertices 133a of each **** 133 of the tabular reinforcing materials 129 by point contact, the slide contact resistance and contact friction by the side of the wire harness 141 at the time of closing motion of the link arm 125, 126 and a slide door are small, wire harness 141 is worn, and ***** is prevented.

[0070] Wire harness 141 curves positively through a slide block 128 from the link arm 125 on the backside, and is connected to the wire harness 143 by the side of the car body by the connector 144 by the back end side of step 142 by the side of bend 141a empty vehicle both this body.

[0071] Drawing 17 shows the structure with a group of a slide block (slider) 128, like drawing 14 of said second operation gestalt, a slide block 128 is divided into the body part 144 and a pressure plate 145, and the wire harness hold slot 149 of the letter of a curve which counters the heavy-gage part 146 in the second half of the body part 144 in the slot 148 inside the arch section 147 of a pressure plate 145 is formed. In the condition of having fitted wire harness 141 (drawing 16) into the hold slot 149, a pressure plate 145 is fixed to a heavy-gage part 146 with two or more machine screws 150.

[0072] the hold slot 149 -- the backside is adjoined a little and the shank 151 (drawing 16) on the backside is formed in a heavy-gage part 146. The shank 151 on the backside consists of a bolt 152, a nut member 153, and a ring 171. The nut member 153 protrudes in the center of the flange 154 which touches the tabular reinforcing materials's 129 rear face, and a flange 154, has the female screw hole 155 inside, and consists of the boss sections 156 located in the slit-like guide hole 130. A ring 171 engages with the periphery of the boss section 156 free [rotation], and ****s to the inside of the guide hole 130. A bolt 152 is inserted in the insertion hole 157 of a heavy-gage part 146 from the front-face side of a heavy-gage part 146, and is screwed in by the female screw hole 155 of the boss section 156.

[0073] Back end section 125a of the link arm 125 on the backside is supported free [rotation] by the shank 140 (drawing 16) by the side of before by the thin-walled part 158 in the first half of the body part 144 of a slide block 128. The shank 140 by the side of before consists of rings 164, 166 which engage with the male screw member 159, the female screw member 160, and each **** member 159, 160. The male screw member 159 consists of a flange 161 which touches the tabular reinforcing materials's 129 rear face, the boss section 162 which protrudes in the center of a flange 161 and is located in the guide hole 130, and the bolt section 163 which protrudes in the center of the boss section 162 and penetrates the guide hole 130. A ring 164 engages with the periphery of the boss section 162 free [rotation], and ****s to the inside of the guide hole 130.

[0074] The female screw member 160 protrudes in the center of the flange 165 which touches the front face of the back end section of the link arm 125 on the backside, and a flange 165, and is located in the pore 170 of the link arm 125, it consists of the boss sections 168 which have the female screw hole 167 inside, a ring 166 engages with the periphery of the boss section 168, and the periphery of a ring 166 engages with a pore 170. The slide member 128 ****s to the guide hole 130 smoothly by the low sliding friction with each ring 171, 164 of order, and is smoothly rotated with the ring 166 by the side of before. The structure of drawing 17 is the same as the structure of drawing 14 .

[0075] In the structure which drawing 18 supported to revolve the end side of link arm 125' which the pair connected, and 126' to the slide door 172 side like the operation gestalt of the above third, and connected the other end side with the slide block (slider) 173 It considers as the guide rail (guide section) made a slide block 173 engaged enabling a free horizontal slide, and is characterized by using the bar-like reinforcing materials 173 of the pipe configuration which is a reinforcement member for the cure against a side collision.

[0076] As for the bar-like reinforcing materials 174, the order both ends are being firmly fixed to the inner panel 176 of a slide door 172 with the bracket 175. Each bracket 175 consists of the leg 177 of a pair, a wall 178 of the perpendicularly the leg 177 is connected, and the tubed fitting section 179 really formed in the wall 178. Insertion immobilization of each edge of the bar-like reinforcing materials 174 is carried out at each tubed fitting section 179, and the leg 177 and the flange 180 of one are fixed to the inner panel 176 with a bolt 181. The bolt 181 of the bracket 175 top by the side of before serves as the shank which supports the front end section of link arm 126' by the side of before.

[0077] By being supported by the bracket 175, from the front face of the inner panel 176, the bar-like reinforcing materials 174 open distance a little, and are located in parallel with the inner panel 176. A little larger slide block 173 is engaging with the bar-like reinforcing materials 174 free [a slide].

[0078] As the detail structure of a slide block 173 is shown in drawing 19 , a slide block 173 is made from synthetic resin and it is constituted possible [division] in the direction of board thickness, and the Brock body 182 of inner panel 176 approach is formed in the shape of an abbreviation rectangle, and the Brock body 183 of vehicle room approach is formed in the configuration which cut the before side upper part in the shape of a rectangle. The sliding slot 184 of a cross-section hemicycle is horizontally formed in the bottom half section of both the block body 182, 183, and each sliding slot 184 coalesces and has a bore [major diameter / outer diameter / of the bar-like reinforcing materials 174 / a little]. It is also

possible to form each sliding slot 184 in a major diameter further, to carry out fitting immobilization of the sleeve (not shown) of the half-rate of a low sliding friction, and to slide the bar-like reinforcing materials 174 in accordance with the inside of a sleeve.

[0079] The crookedness slot 185 where the cross-section hemicycle for holding wire harness 141' in the condition of having made it curving positively curved is formed in the Johan section of each block body 182,183. The fixed hole 186 for supporting back end section 125a[of link arm 125' on the backside] ' free [rotation] by shank 140' is formed in the Brock body 182 of inner panel 176 approach like drawing 18 . Both the block body 182,183 is in the condition to which the bar-like reinforcing materials 174 were made to engage with, and fitting of wire harness 141' was carried out, and coalesce immobilization is carried out with two or more machine screws 187.

[0080] In drawing 18 , it is connected free [closing motion] by central shank 139', and **** immobilization of wire harness 141' is carried out along with link arm 125' of a pair, and 126', and link arm 125' of a pair and 126' are positively projected through a slide block 173, curve, are turned up by the Ushiro sense, and the connector joint is carried out to wire harness 143' by the side of the car body by the step posterior part.

[0081] Since it is not necessary to newly prepare a guide rail, while components cost, and the number of shipfitters and attachment cost of components are reduced according to the structure which used the bar-like reinforcing materials 174 of drawing 18 also [guide rail], lightweight-ization of a slide door 172 is attained. Especially, since a guide rail 174 has the shape of a pipe in the air, it is lightweight. the case where were hard to bend, pried at the time of closing motion of link arm 125' of a pair, and 126', and the force etc. acts since the bar-like reinforcing materials 174 are excellent in flexural rigidity although it was also the same as when using solid cylinder-like bar-like reinforcing materials (not shown) -- a knee -- there is nothing -- truth -- it can be located direct and a slide block 173 can be ****ed smoothly.

[0082] In addition, bar-like reinforcing materials can apply the thing of various configurations, such as the shape of the shape not only of a cross-section round shape but a cross-section triangle, or an L type. Moreover, it is also possible to apply the structure of the guide rail shown in drawing 16 - drawing 19 to the guide rail of the first operation gestalt (drawing 1 - drawing 9).

[0083] Drawing 20 - drawing 21 show the fourth operation gestalt of the electric supply structure of the slide door for automobiles concerning this invention. This structure is arranged free [crookedness of the link arm 191,192 of the pair connected with the inside side of a slide door 1 like drawing 20 in the shape of / as a wire harness holddown member / abbreviation reverse V character]. Wire harness 193 is ****(ed) along with the link arm 191,192 of a pair. While the first guide hole (guide section) 195 prolonged in Masanao at the car cross direction is formed in the plate-like plate 194 by the side of the inside of a slide door 190 The second guide hole (guide section) 196 which curved in the shape of radii with the first guide hole 195 up side is formed. End section 191a of the link arm 191,192 of a pair is supported to revolve free [rotation] by the plate 194. The other end 192a side of the link arm 191,192 of a pair engages with the first guide hole 195 free [a slide], and it is characterized by engaging the shank 197 of the center which is the connection section of the link arm 191,192 of a pair free [a slide] at the second guide hole 196.

[0084] A plate 194 is formed in the shape of a rectangle with a metal plate or a synthetic-resin plate, and the peripheral edge section is being fixed to the inner panel 199 of a slide door 190 with the bolt 198. It is also possible to form the direct, first, and second guide holes 195,196 in the inner panel 199, without using a plate 194. In that case, it is necessary to form evenly the part of the inner panel 199 which forms both the guides hole 195,196 at least.

[0085] In the lower limit section approach of a plate 194, the first guide hole 195 is formed horizontally. A little in the front end section top of the first guide hole 195, front end section 191a of the link arm 191 by the side of before is connected with the plate 194 by the shank 200 by the side of before. The link arm 191 by the side of before can be freely rotated focusing on a shank 200. In this specification, it is in agreement with order car travelling direction order.

[0086] It is connected by the shank 197 of the center the link arm 191 by the side of before and whose link arm 192 on the backside are said connection sections. Back end section 192a of the link arm 192 on the backside is supported to revolve with a shank 202 free [rotation] at the front end side of the rectangle Brock-like slide block (slider) 201, and the slide block 201 is engaging with the first guide hole 195 free [a slide] through the near shank 203 the back in parallel with a shank 14. The flange (not shown) which ****s at the rear face of a plate 194 is prepared in the shank 203. It is possible to also make the shank 202 by the side of before engage with the first guide hole 195 free [a slide] with the shank 203 on the backside. The pars intermedia of wire harness 193 is being fixed to the slide block 201 by the half-rate-like cylinder part material 204.

[0087] Along with the link arm 192 on the backside, **** immobilization is carried out from the link arm 191 by the side of before, and wire harness 193 curves from a slide block 201, and is connected to the wire harness 204 by the side of the body of the car body by the connector 206 near the step section of the body of the car body. Moreover, wire harness 193 is introduced into the interior of a slide door 190 from the link arm 191 by the side of before, and is connected to the electric

equipment article which is not illustrated in a slide door. the link arm 191,192 of the pair connected in the shape of abbreviation reverse V character, and truth -- the configuration using the first guide hole 195, direct slide block 201, and direct plate 194 is replaced with the tabular reinforcing materials in the third operation gestalt of said drawing 16 , and is almost the same as the configuration using a plate 194.

[0088] The link arm 191,192 of a pair is connected in the crowning, and the shank 197 of the center which is the connection section is engaging with the second radii-like guide hole 196 free [a slide]. This point is the description part which is not in said operation gestalt. Blurring and with backlash are prevented because the shank 197 which is the connection section of the link arm 191,192 of a pair engaged with the second radii-like guide hole 196 free [a slide]. [of the link arm 191,192]

[0089] The second guide hole 196 is arranged at the first portion bottom of the first guide hole 195, front end 196a of the second guide hole 196 is located in mist or back from front end 195a of the first guide hole 195 in the upper limit section of a plate 194, and the back end of the second guide hole 196 is located in the longitudinal direction pars intermedia bottom of the first guide hole 195 in the height direction pars intermedia of a plate 194. The link arm 191 by the side of before moves circularly considering the shank 200 by the side of before as a core, and the direction's [the radii configuration and the curve direction] of the guide hole 196 of the second corresponds with the rotation locus of the point 197 of the link arm 191 by the side of before, i.e., the connection section of the link arm 191,192 of a pair.

[0090] The insertion hole 207 of a circle diameter [major diameter / dimension / D / of the guide hole 197 / width-of-face] is formed in the back end section of the second guide hole 196. The flange 208 (drawing 21) of the central shank 197 is inserted from this insertion hole 207, it is located in the rear-face side of a plate 194, and a slide contact becomes possible along the periphery 209 of the second guide hole 196 by the rear-face side. When the location of the insertion hole 207 stops a slide door 190, it is arranged in the location at which the central shank 197 does not arrive. The die length of the second guide hole 196 is set up for a long time than the rotation locus of the link arm 191 by the side of before [at the time of closing motion of a slide door 190]. Although the central shank 197 moves towards a back end side from the front end side of the second guide hole 196 as a slide door 190 is shut to the front, a shank 197 is located before the insertion hole 207 at the time of the close by-pass bulb completely of a slide door 190.

[0091] It is prevented by this that the central shank 197 separates from the second guide hole 196 at the time of closing motion of a slide door 190, and the link arm 191,192 of a pair is always supported by stability with the second guide hole 196 that there is nothing with backlash. Moreover, the activity to which the central shank 197 is made to engage with the second guide hole 196 with the insertion hole 207 easy-izes.

[0092] In addition, it is also possible to adopt the same configuration as the insertion hole 207 as engagement to the shank 202,203 before and behind a truth first direct guide hole 195 and slide-block 201 side. That is, the insertion hole [major diameter / flange / (not shown) / of a shank 202,203] (not shown) is formed in the back end section of the first guide hole 195. The die length of the first guide hole 195 is set up so that the backmost shank 203 may not reach the insertion hole at the time of closing motion of a slide door 190.

[0093] Drawing 21 is the C-C sectional view of drawing 20 showing the engagement condition of the central shank 197 and the second guide hole 196 of the shape of radii of a plate 194 which are the connection section of the link arm 191,192 of a pair. The central shank 197 has the first flange 208 and second flange 210 which countered the front rear face of a plate 194 so that a plate 194 might be inserted. Even if it says that it inserts, it does not touch strongly, but each flange 208,210 touches the periphery 209 of the second guide hole 196 weakly with the clearance between some. Both the flanges 208,210 act as the slide contact section to the periphery of the second guide hole 196.

[0094] The first flange 208 is formed in the end face side of the axial short cylinder-like body 211 rather than the inner width of face of the second guide hole 196 at a major diameter, and is formed in mist or a minor diameter from the bore of the insertion hole 207 (drawing 20) of guide hole termination. The second flange 210 is formed in the major diameter in the longitudinal direction pars intermedia of the axial body 211 rather than the first flange 208 and insertion hole 207 (drawing 20). The circumferential groove 212 made the periphery section 209 of the second guide hole 196 of a plate 194 engaged among both the flanges 208,210, enabling a free slide is constituted. The slide engagement section 213 to the second guide hole 196 consists of an axial body 215 and both flanges 208,210. The central shank 197 equips one with the slide engagement section 213.

[0095] The first flange 208 is inserted in the rear-face side of a plate 194 from the insertion hole 207 (drawing 20), and the axial body 211 is engaged free [a slide] in the second guide hole 196. When the first flange 208 by the side of a minor diameter is inserted into the insertion hole 207, the second flange 210 by the side of a major diameter contacts the front face of a plate 194. The distance between the first flange 208 and the second flange 210 can be a little larger than the board thickness of a plate 194, and both the flanges 208,210 can **** along the front rear face of a plate 194. The clearance between each flange 208,210 and a plate 194 has the small link arm 191,192 of a pair to extent which does not

generate backlash and an allophone to a plate 194.

[0096] The minor diameter male screw section 214 is formed in the tip side of the axial body 211, and the nut member 215 with a collar is screwed in the male screw section 214. The circular hole 216 of the connection side edge section of phosphorus AKUMU 191 by the side of before is extrapolated by the axial body 211 through a color 217, and the circular hole 218 of the connection side edge section of the link arm 192 on the backside is extrapolated by the shank 220 of the nut member 215 through the color 219. It is equipped with the washer 221 between both the links arms 191,192. The flange 222 of the nut member 215 is in contact with the link arm 192 on the backside free [sliding]. The link arm 191,192 of a pair is held free [rotation] between the second flange 210 and the third flange 222. It binds tight to the third flange 222 and the engagement hole 223 to an ingredient (not shown) is formed in it.

[0097] In addition, it is also possible to use the ring E which is not illustrated as the second flange 210, a washer, etc. In the case of a ring E, a circumferential groove is formed in the axial body 211, and in the case of a washer, it dashes against the axial body 211, it forms a step, and it is made not to sandwich a plate 194 strongly between the first flange 208.

[0098] In drawing 20, the slide door 190 is engaging with the guide rail by the side of the body of the car body (not shown) free [a slide] in the slide section 224. In the condition of aperture halfway (full open nearness) of the slide door 190 of drawing 20, the link arm 191,192 of a pair stands up in the shape of abbreviation reverse V character, and is located. By making a slide door 190 slide back from this condition, and making it full open, it rotates ahead by using the shank 200 by the side of before as the supporting point, and the link arm 191,192 of a pair stands up almost perpendicularly. Under the present circumstances, a slide block 201 moves to the front end side of the first guide hole 195, and moves the central shank 197 to the front end side of the second guide hole 196.

[0099] Moreover, it follows on making a slide door 190 slide ahead and stopping from the condition of drawing 20, and a slide block 201 moves back along with the first guide hole 195, and opens the link arm 191,192 of a pair in the shape of [to abbreviation] a character like the chain line. Under the present circumstances, the central shank 197 moves back in the shape of radii along with the second guide hole 196. The link arm 191 by the side of before rotates the shank 200 by the side of before as the supporting point, and the central shank 197 draws a radii-like locus along with the second guide hole 196 in connection with it.

[0100] In addition, it is fixed to the body side of the car body with flexibility by bend part 193a following the body side of slide-block 201 empty-vehicle both the bodies, and closing motion (telescopic motion) actuation of the link arm 191,192 of the pair accompanying closing motion of a slide door 190 by it is possible for wire harness 193. At the time of closing motion of a slide door 190, bend part 193a of wire harness 193 does not move so much substantially with a slide block 201, but only a slide door 190 moves it forward and backward. It means that the slide block 201 had moved relatively to the slide door 190 by that cause.

[0101] Since the link arm 191,192 of a pair is engaging with the second guide hole 196 of a plate 194 in the connection section 197 of the center, also by the impact at the time of the switching operation of a slide door 190, and car transit, or vibration The link arm 191,192 and shank 197 of a pair rub against the internal surface and other components which are not illustrated of a slide door 190, or it does not collide. Moreover, there is no **** squirrel ***** with backlash of 191,192 link arm of a pair mutually, and, thereby, generating of a blemish, the allophone [the wire harness 193 on the link arm 191,192 or a link arm,] of a slide door 190, etc. is prevented.

[0102] In addition, in the operation gestalt of the above fourth, it is also possible to replace with the first [of a plate 194] and second guide holes 195,196, and to fix to the inner plate 194 of a slide door 190 directly each guide rail (not shown) which has each guide hole. Moreover, it is also possible to use not two or more electric wires but one electric wire and a cabtire cable as wire harness 193. Moreover, it is also possible to replace with the central shank 197 and to prepare the slide engagement section (not shown) to the second guide hole 192 near the connection section of the link arm 191 by the side of before.

[0103] Moreover, it is also possible to replace with and use the structure of the guide hole 195 of the fourth operation gestalt (drawing 20) for the guide rail 3 of the first operation gestalt (drawing 1). Moreover, it is also possible to apply the structure which extrapolated the coil member 39 (drawing 2) to the bend of the wire harness in the first operation gestalt, the structure which has arranged the coil member 41 (drawing 3) to the both ends of a bend, and the configuration whose wire harness is a cabtire cable 6 (drawing 4) to the above third and the fourth operation gestalt. Moreover, it is also possible to apply the second guide hole 196 of the fourth operation gestalt and the structure of the slide engagement section 213 to the structure using the bar-like reinforcing materials 174 of drawing 18 of the third operation gestalt especially.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

Brief Description of the Drawings]

Drawing 1] It is the perspective view showing the first operation gestalt (structure using a slider) of the electric supply structure of the slide door for automobiles concerning this invention.

Drawing 2] It is the perspective view showing 1 operation gestalt of the bend of wire harness.

Drawing 3] It is the perspective view showing other operation gestalten of the bend of wire harness.

Drawing 4] It is the sectional view showing the cable which is one gestalt of wire harness.

Drawing 5] It is the front view showing the condition when closing a slide door.

Drawing 6] It is the front view showing the condition when opening a slide door.

Drawing 7] It is the top view showing the condition when closing a slide door.

Drawing 8] It is the top view showing the condition in the middle of opening a slide door.

Drawing 9] It is the top view showing the condition when opening a slide door.

Drawing 10] It is the perspective view showing the second operation gestalt (structure using a link arm) of the electric supply structure of the slide door for automobiles concerning this invention.

Drawing 11] It is the side elevation which fractured the part which shows the attachment condition of a link arm.

Drawing 12] It is the front view showing the operating state of the link arm on a guide rail.

Drawing 13] It is the top view which fractured the part which shows the attachment condition of a link arm.

Drawing 14] It is the perspective view showing 1 operation gestalt of the bend of wire harness.

Drawing 15] It is the perspective view showing other operation gestalten of the bend of wire harness.

Drawing 16] It is the perspective view showing the third operation gestalt (structure which made reinforcing materials the guide section) of the electric supply structure of the slide door for automobiles concerning this invention.

Drawing 17] It is the decomposition perspective view showing the structure with a group of a slide block.

Drawing 18] It is the perspective view showing other operation gestalten of the electric supply structure of the slide door for automobiles which made reinforcing materials the guide section.

Drawing 19] It is the decomposition perspective view showing the prefabricated frame structure of a slide block.

Drawing 20] It is the perspective view showing the fourth operation gestalt (structure using the second guide section) of the electric supply structure of the slide door for automobiles concerning this invention.

Drawing 21] It is the C-C sectional view of drawing 20 showing the connection section, i.e., the slide engagement section.

Drawing 22] It is the perspective view showing the 1 conventional example.

Drawing 23] Other conventional examples are shown and it is (a). The cross-sectional view at the time of door close, and (b) It is a cross-sectional view at the time of door open.

Drawing 24] The conventional example of others similar to drawing 23 is shown, and it is (a). The cross-sectional view at the time of door close, and (b) It is a cross-sectional view at the time of door open.

Description of Notations]

1,127,172,190 Slide door

3 51 Guide rail (guide section)

4 56,128,173,201 Slide block (slider)

5 Take-up Reel

5, 54,141,141', 193 Wire harness

7 Guide Idler (Harness Support Guide)

17 55,130,195 Guide hole (guide section)

24, 68, 71,202,203 Shank

8, 75, 141a, 193a Bend
9, 95, 40-41, 96-97 Coil spring (coil member)
2, 53, 125, 126, 125', 126' 191, 192 Link arm
29 Tabular Reinforcing Materials
74 Bar-like Reinforcing Materials
94 Plate
97 Shank (Connection Section)
99 Inner Panel
207 Insertion Hole
208, 210 Flange

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

Claim(s)]

[Claim 1] Electric supply structure of the slide door for automobiles characterized by having prepared the guide section of the slide door closing motion direction in the slide door, having made the slider engage with this guide section, enabling a free slide, having fixed the wire harness by the side of a slide door to this slider, and forming a bend in this wire harness between this slider and a car-body side.

[Claim 2] Electric supply structure of the slide door for automobiles according to claim 1 characterized by having prepared the harness support guide in said slide door [above said guide section], having applied to said slider from this harness support guide, and hanging said wire harness.

[Claim 3] Electric supply structure of the slide door for automobiles according to claim 2 characterized by having the take-up reel which energizes said slider in the direction of slide door closing.

[Claim 4] Electric supply structure of the slide door for automobiles characterized by having prepared the guide section of the slide door closing motion direction in the slide door, having made the slider engage with this guide section, enabling a free slide, having connected the end side of the link arm of the pair connected with this slider, having made the other end side of the link arm of this pair support to revolve to this slide door side, and ****(ing) wire harness from the link arm of this pair to this slider.

[Claim 5] Electric supply structure of the slide door for automobiles according to claim 4 characterized by forming a bend in said wire harness between said slider and a car-body side.

[Claim 6] Electric supply structure of the slide door for automobiles according to claim 4 or 5 where the end side of the link arm of said pair is connected with said slider by the shank, and is characterized by being engaged free [the slide to the guide hole of said guide section] for this shank.

[Claim 7] claim 1- characterized by a coil member being extrapolated by the bend of said wire harness -- the electric supply structure of the slide door for automobiles given in any of 3 and 5 they are.

[Claim 8] Electric supply structure of the slide door for automobiles according to claim 7 characterized by having arranged said coil member to the both ends of said bend.

[Claim 9] Electric supply structure of the slide door for automobiles given in any of claims 1-8 characterized by what said guide section was constituted for by the reinforcing materials of said slide door they are.

[Claim 10] Electric supply structure of the slide door for automobiles according to claim 9 which said reinforcing materials are **** type tabular reinforcing materials, and is characterized by forming the guide hole as said guide section in this tabular reinforcing materials.

[Claim 11] Electric supply structure of the slide door for automobiles according to claim 9 characterized by said reinforcing materials being bar-like reinforcing materials.

[Claim 12] said slide door side -- the second radii-like guide section -- preparing -- this -- the electric supply structure of the slide door for automobiles given in any of claims 4-9 characterized by making the slide engagement section of the link arm of said pair engage with the second guide section, enabling a free slide they are.

[Claim 13] Electric supply structure of the slide door for automobiles according to claim 12 characterized by forming each guide hole as said guide section and said second guide section in an inner panel or a plate.

[Claim 14] Electric supply structure of the slide door for automobiles according to claim 12 or 13 characterized by preparing said slide engagement section in the connection section of the link arm of said pair.

[Claim 15] Electric supply structure of the slide door for automobiles given in any of claims 12-14 characterized by engaging the periphery of the guide hole as said second guide section between the flanges of this pair including the flange which a pair counters said slide engagement section is.

[Claim 16] one side of the flange of said pair -- a minor diameter -- and the electric supply structure of the slide door for

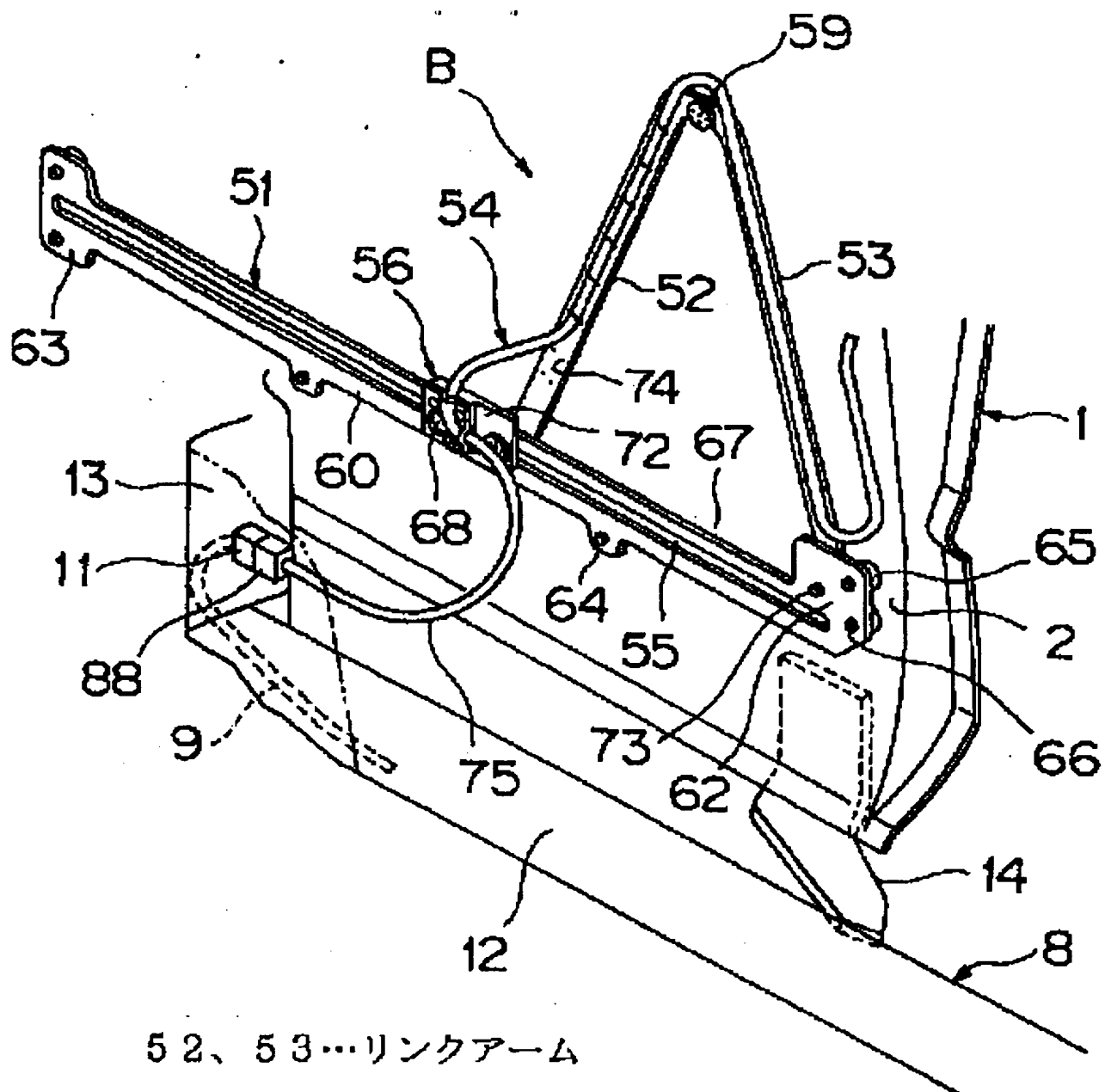
automobiles according to claim 15 characterized by having been formed in the major diameter, and opening for free passage and preparing the insertion hole to one [this] flange in the edge of this guide hole rather than the guide hole which is said second guide section.

[Claim 17] Electric supply structure of the slide door for automobiles given in any of claims 1-8 characterized by said guide section being a guide rail tabular [long] they are.

[Claim 18] Electric supply structure of the slide door for automobiles given in any of claims 4-17 characterized by having arranged the link arm of said pair upward to said guide section they are.

[Claim 19] Electric supply structure of the slide door for automobiles given in any of claims 1-18 characterized by said wire harness being a cabtire cable they are.

[Translation done.]



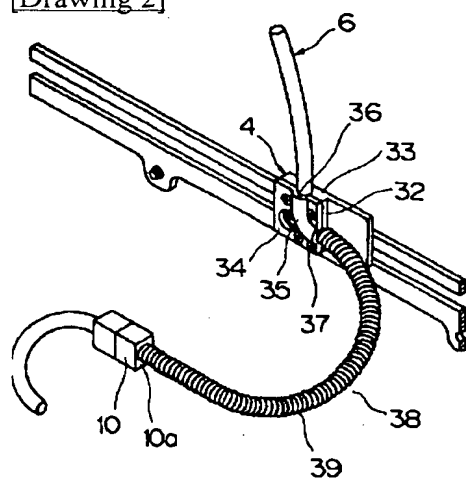
* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

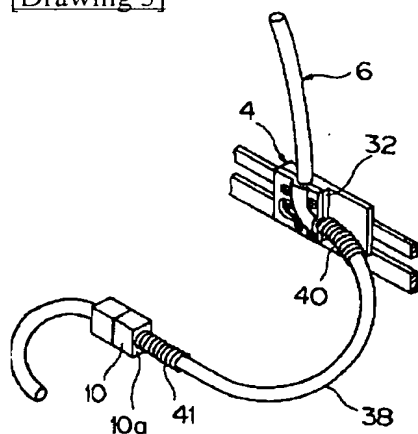
DRAWINGS

[Drawing 2]

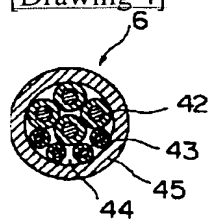


39...コイルスプリング

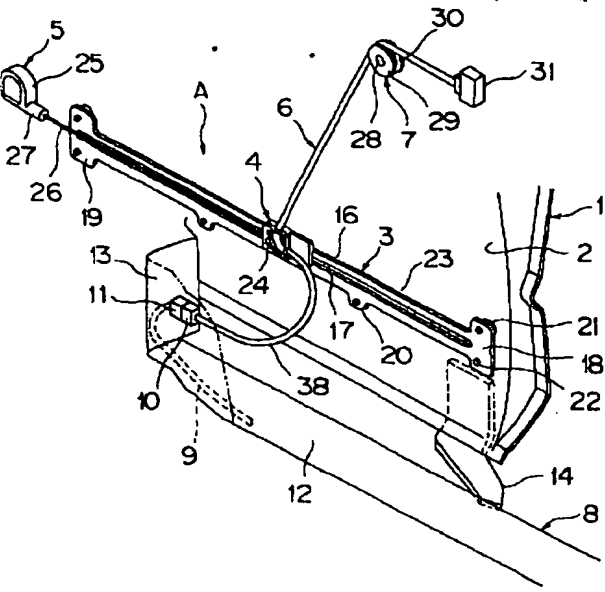
[Drawing 3]



[Drawing 4]

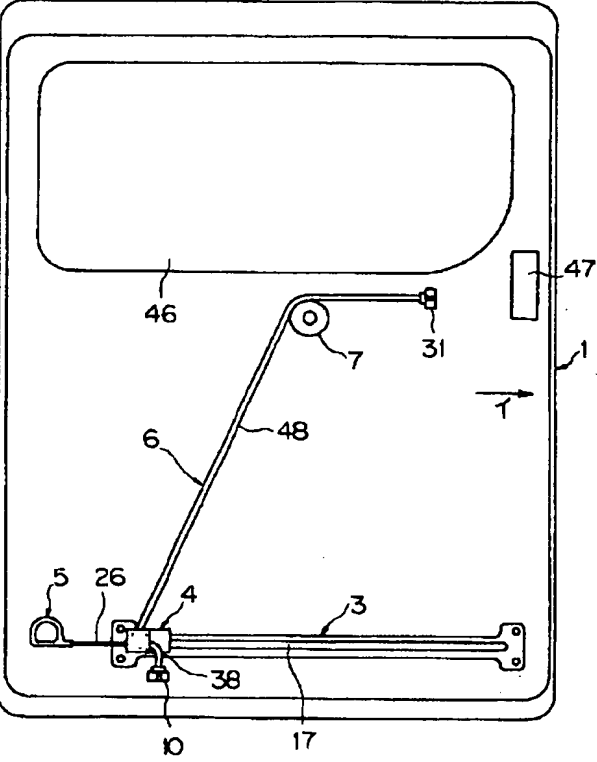


[Drawing 1]

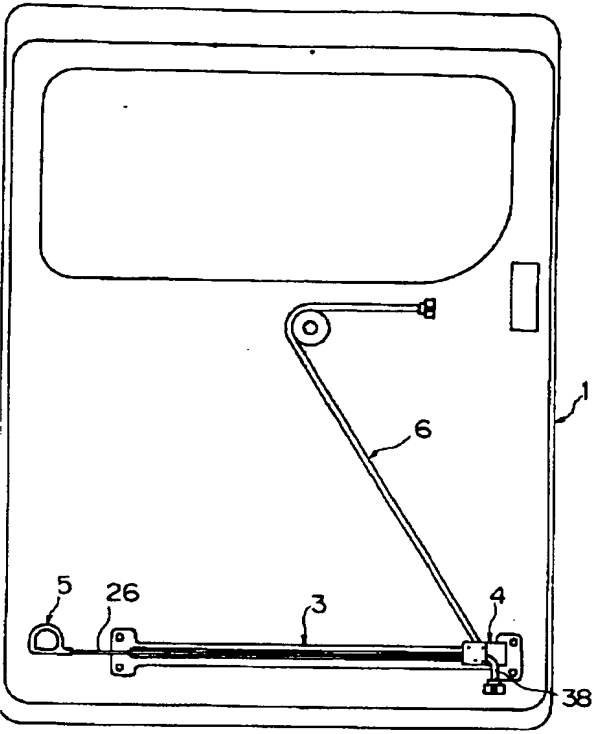


- | | |
|--------------|-----------|
| 3...ガイドレール | 17...ガイド孔 |
| 4...スライドブロック | 24...軸部 |
| 5...巻取リール | 38...湾曲部 |
| 7...ガイドローラ | |

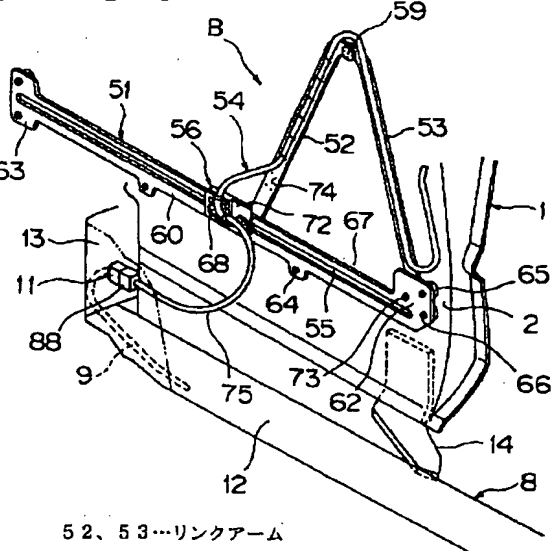
[Drawing 5]



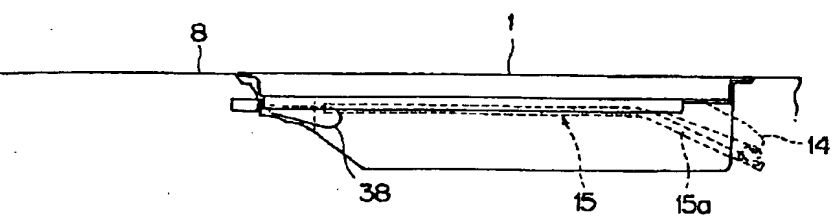
[Drawing 6]



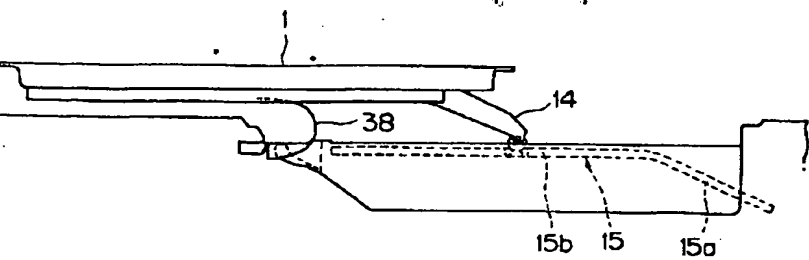
[Drawing 10]



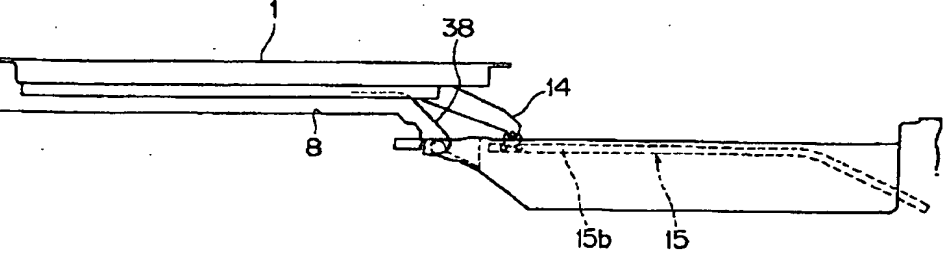
[Drawing 7]



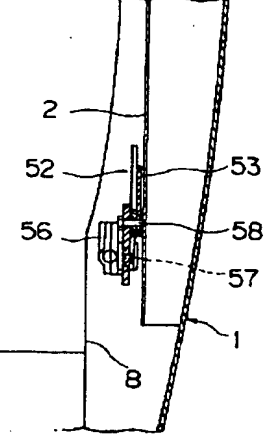
[Drawing 8]



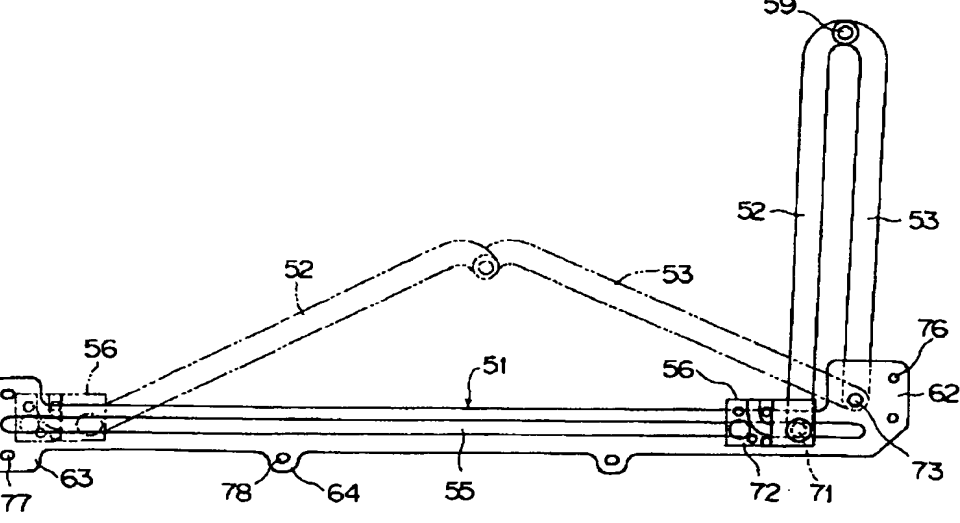
Drawing 9]



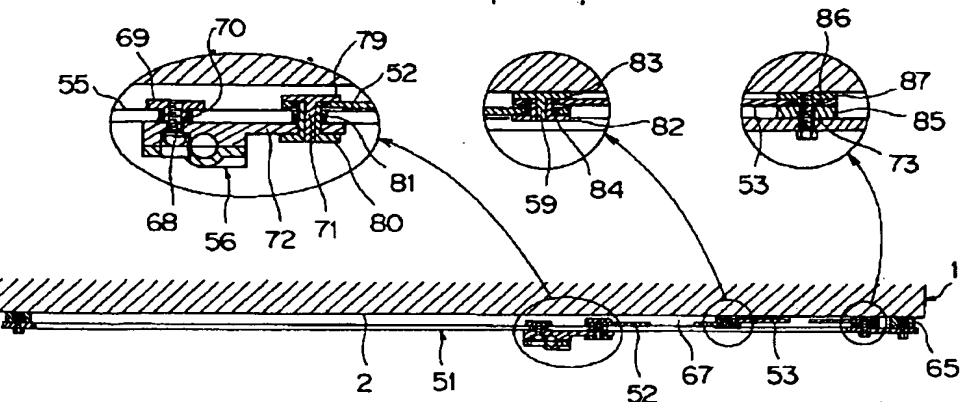
Drawing 11]



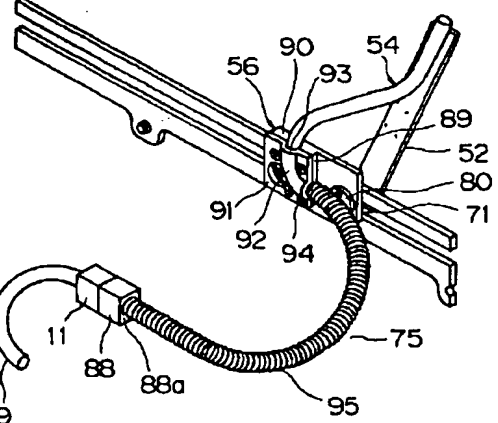
Drawing 12]



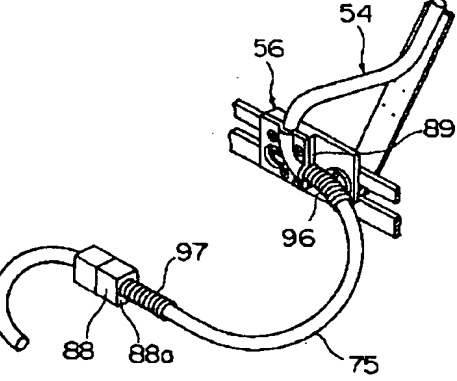
Drawing 13]



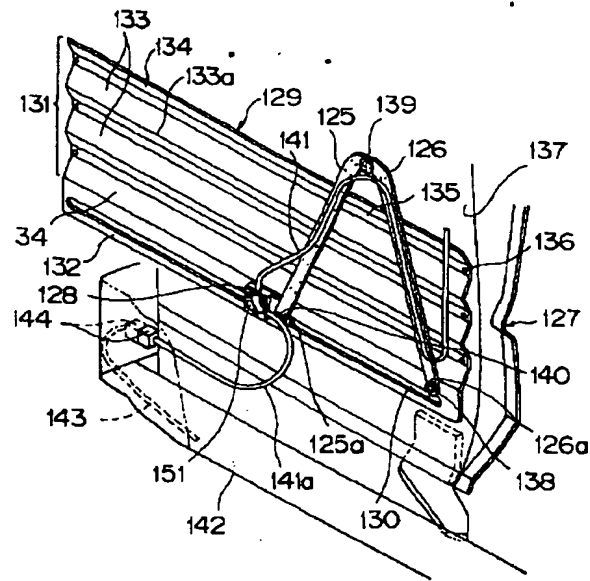
Drawing 14]



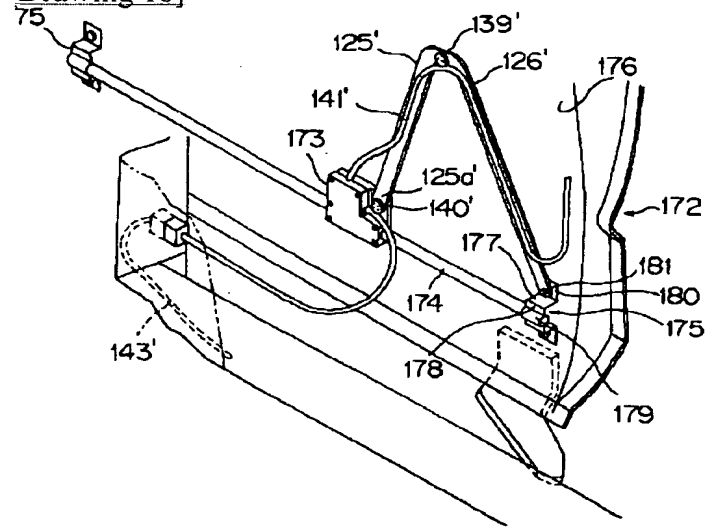
Drawing 15]



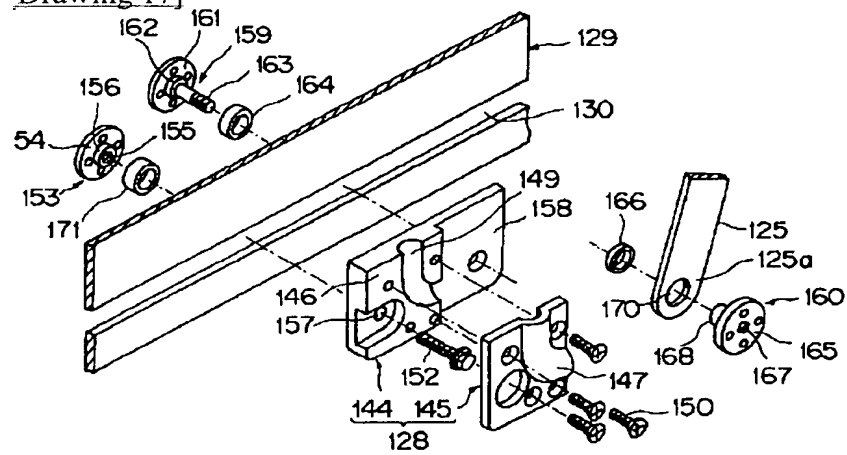
Drawing 16]



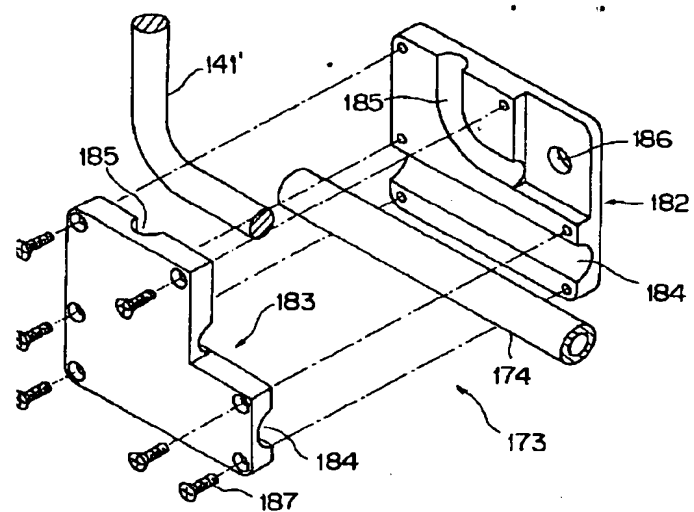
Drawing 18]



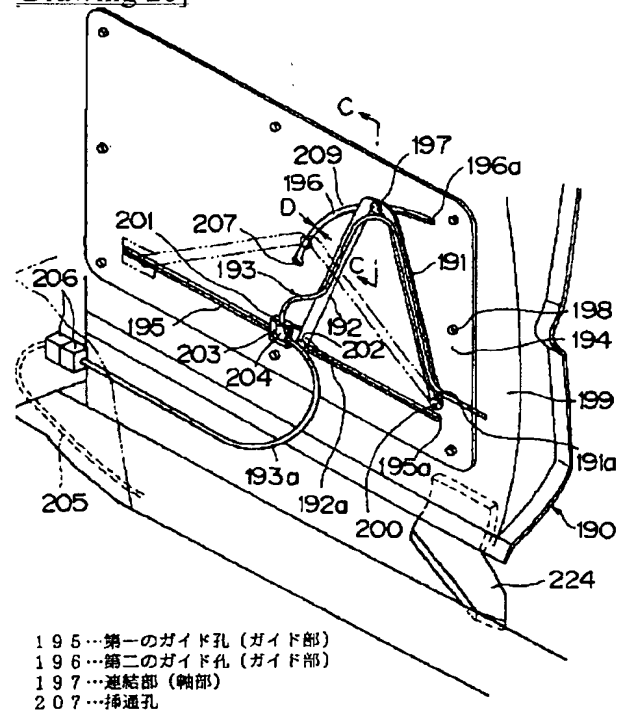
Drawing 17]



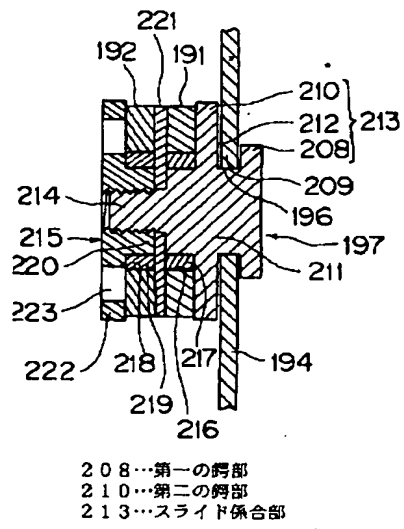
Drawing 19]



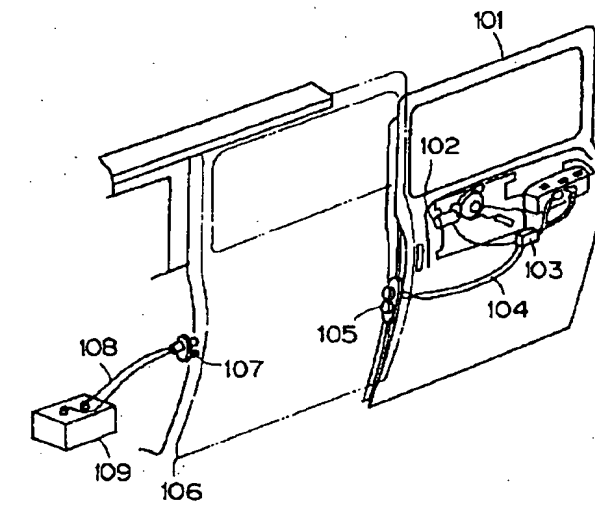
[Drawing 20]



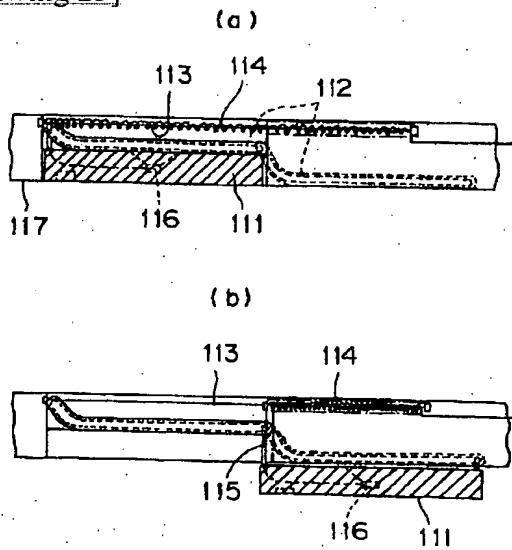
[Drawing 21]



[Drawing 22]

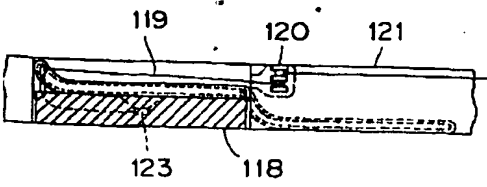


[Drawing 23]

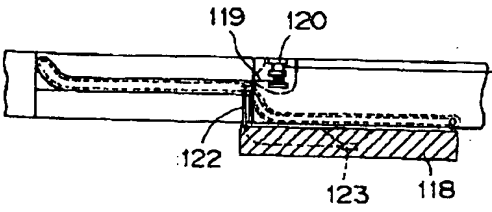


[Drawing 24]

(a)



(b)



[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2000-264136

(P2000-264136A)

(43) 公開日 平成12年9月26日 (2000.9.26)

(51) Int.Cl.⁷

B 6 0 R 16/02

H 0 2 G 11/00

識別記号

6 2 0

F I

B 6 0 R 16/02

H 0 2 G 11/00

データベース* (参考)

6 2 0 C

M

審査請求 未請求 請求項の数19 O L (全 20 頁)

(21) 出願番号 特願平11-374770

(22) 出願日 平成11年12月28日 (1999. 12. 28)

(31) 優先権主張番号 特願平11-5314

(32) 優先日 平成11年1月12日 (1999. 1. 12)

(33) 優先権主張国 日本 (J P)

(71) 出願人 000006895

矢崎総業株式会社

東京都港区三田1丁目4番28号

(72) 発明者 室伏 悟

静岡県裾野市御宿1500 矢崎総業株式会社
内

(72) 発明者 堂下 憲一

静岡県裾野市御宿1500 矢崎総業株式会社
内

(74) 代理人 100060690

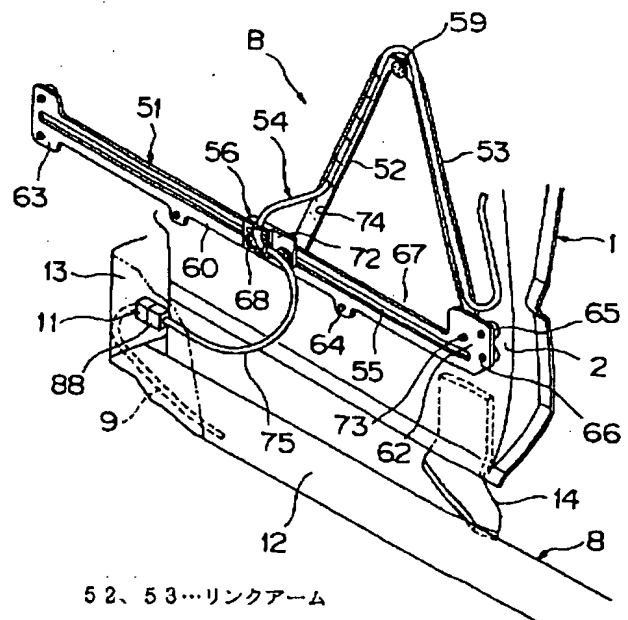
弁理士 瀧野 秀雄 (外1名)

(54) 【発明の名称】 自動車用スライドドアの給電構造

(57) 【要約】

【課題】 簡単な構造で車体側からスライドドア側に常時給電させる。

【解決手段】 スライドドア1のスライドドア開閉方向のガイド部51にスライダ56に係合させ、スライダにドア側のワイヤハーネス54を固定し、スライダと車体側との間でワイヤハーネスに湾曲部75を形成した。スライダ56に、連結された一対のリンクアーム52、53の一端側を連結し、他端側をスライドドア側に軸支させ、リンクアームからスライダにワイヤハーネス54を配索した。ガイド部51をスライドドアの補強材で構成してもよい。スライドドア側に円弧状の第二のガイド部を設け、第二のガイド部に一対のリンクアーム52、53の連結部59のスライド係合部に係合させてもよい。



【特許請求の範囲】

【請求項 1】 スライドドアにスライドドア開閉方向のガイド部を設け、該ガイド部にスライダをスライド自在に係合させ、該スライダにスライドドア側のワイヤハーネスを固定し、該スライダと車体側との間で該ワイヤハーネスに湾曲部を形成したことを特徴とする自動車用スライドドアの給電構造。

【請求項 2】 前記ガイド部の上方において前記スライドドアにハーネス支持ガイドを設け、該ハーネス支持ガイドから前記スライダにかけて前記ワイヤハーネスを吊り下げたことを特徴とする請求項 1 記載の自動車用スライドドアの給電構造。

【請求項 3】 前記スライダをスライドドア閉じ方向に付勢する巻取リールを備えたことを特徴とする請求項 2 記載の自動車用スライドドアの給電構造。

【請求項 4】 スライドドアにスライドドア開閉方向のガイド部を設け、該ガイド部にスライダをスライド自在に係合させ、該スライダに、連結された一对のリンクアームの一端側を連結し、該一对のリンクアームの他端側を該スライドドア側に軸支させ、該一对のリンクアームから該スライダにワイヤハーネスを配索したことを特徴とする自動車用スライドドアの給電構造。

【請求項 5】 前記スライダと車体側との間で前記ワイヤハーネスに湾曲部を形成したことを特徴とする請求項 4 記載の自動車用スライドドアの給電構造。

【請求項 6】 前記一对のリンクアームの一端側が軸部で前記スライダに連結され、該軸部が前記ガイド部のガイド孔にスライド自在に係合したことを特徴とする請求項 4 又は 5 記載の自動車用スライドドアの給電構造。

【請求項 7】 前記ワイヤハーネスの湾曲部にコイル部材が外挿されたことを特徴とする請求項 1～3、5 の何れかに記載の自動車用スライドドアの給電構造。

【請求項 8】 前記コイル部材が前記湾曲部の両端部に配置されたことを特徴とする請求項 7 記載の自動車用スライドドアの給電構造。

【請求項 9】 前記ガイド部が前記スライドドアの補強材によって構成されたことを特徴とする請求項 1～8 の何れかに記載の自動車用スライドドアの給電構造。

【請求項 10】 前記補強材が略波型の板状補強材であり、該板状補強材に前記ガイド部としてのガイド孔が形成されたことを特徴とする請求項 9 記載の自動車用スライドドアの給電構造。

【請求項 11】 前記補強材がバー状補強材であることを特徴とする請求項 9 記載の自動車用スライドドアの給電構造。

【請求項 12】 前記スライドドア側に円弧状の第二のガイド部を設け、該第二のガイド部に前記一对のリンクアームのスライド係合部をスライド自在に係合させたことを特徴とする請求項 4～9 の何れかに記載の自動車用スライドドアの給電構造。

【請求項 13】 前記ガイド部及び前記第二のガイド部としての各ガイド孔がインナパネル又はプレートに形成されたことを特徴とする請求項 12 記載の自動車用スライドドアの給電構造。

【請求項 14】 前記スライド係合部が前記一对のリンクアームの連結部に設けられたことを特徴とする請求項 12 又は 13 記載の自動車用スライドドアの給電構造。

【請求項 15】 前記スライド係合部が一对の対向する鏝部を含み、該一对の鏝部の間に、前記第二のガイド部としてのガイド孔の周縁に係合したことを特徴とする請求項 12～14 の何れかに記載の自動車用スライドドアの給電構造。

【請求項 16】 前記一对の鏝部的一方が小径に且つ前記第二のガイド部であるガイド孔よりも大径に形成され、該一方の鏝部に対する挿通孔が該ガイド孔の端部に連通して設けられたことを特徴とする請求項 15 記載の自動車用スライドドアの給電構造。

【請求項 17】 前記ガイド部が長尺板状のガイドレールであることを特徴とする請求項 1～8 の何れかに記載の自動車用スライドドアの給電構造。

【請求項 18】 前記一对のリンクアームが前記ガイド部に対して上向きに配置されたことを特徴とする請求項 4～17 の何れかに記載の自動車用スライドドアの給電構造。

【請求項 19】 前記ワイヤハーネスがキャブタイヤケーブルであることを特徴とする請求項 1～18 の何れかに記載の自動車用スライドドアの給電構造。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、スライドドア側のワイヤハーネスを固定したスライダをガイド部にスライド自在に係合させて、スライドドア開閉時におけるスライドドア側のワイヤハーネスと車体側のワイヤハーネスとの接続位置を常に一定とした自動車用スライドドアの給電構造に関するものである。

【0002】

【従来の技術】ワンボックスカーや一部の乗用車に見られるスライドドアの内部のパワーウィンドモータやドアロックユニットやスピーカといった各補機をドアワイヤハーネスを介して車体側（電源側）のワイヤハーネスに接続するために、従来色々な手段が講じられている。

【0003】図 22 は、一例として実開平 4-124555 号公報に記載された従来の自動車用スライドドアの給電構造を示すものであり、スライドドア 101 内の各補機 102 はコントローラ 103 を介してワイヤハーネス 104 に接続され、ワイヤハーネス 104 の末端がドア前端部の方の接点 105 に接続されている。車体 106 側には他方の接点 107 が設けられ、接点 107 はワイヤハーネス 108 を介してバッテリー 109 に接続されている。車体側の接点 107 は防塵・防水のための図

示しない可動接点を介してスライドドア側の接点105に接続される。

【0004】しかしながら、上記構造にあっては、スライドドア101の開時にのみ通電が行われ、ドア101が少しでも開いた状態では、パワーウィンドの開閉やスピーカ等の補機の作動が行われないう欠点があった。また、防塵・防水用の可動接点を介して両接点105、107を接続させる所謂二重接点になっているために、接触抵抗が増し、接続の信頼性が低下するという懸念があった。

【0005】また、上記構造とは別に一般の建物用のドアにおける給電構造（図示せず）として、実開平5-28893号に、二つの中空のアームを中空の回転軸で連結し、一方のアームをドアに固定し、他方のアームを建物に固定して、アームの内部に電線を挿通させる構造が提案されている。

【0006】しかしながら、この構造にあっては、ドアが一軸で同心円の開閉動作をする場合には対応可能であるが、自動車のスライドドアのように二次元的で且つ曲線動作を含む開閉動作をするものや、三次元的な開閉動作をするものには適用できず、またアームの肥大化により構造が大型化、複雑化するという問題や、アームが開閉時に振れや異音等を生じやすく、スムーズな開閉を行いにくといった懸念があった。

【0007】一方、特開平7-22274号には、図23(a)(b)～図24(a)(b)に示す自動車用スライドドアの給電構造が提案されている。図23(a)(b)の構造においては、スライドドア111に対する車体117側のガイドレール112に沿って支持棒113が取り付けられ、支持棒113にカール形状の電線（ワイヤハーネス）114が巻装され、電線114の一端側がヒンジ部115を介してスライドドア111のスピーカ116に接続され、電線114の他端側が車体側のオーディオ本体（図示せず）に接続されている。図23(a)のドア閉時において電線114は支持棒113に沿って延び、図23(b)のドア開時において電線114は縮んで収納される。

【0008】また、図24(a)(b)に示す構造においては、スライドドア118の開閉動作に伴って電線（ワイヤハーネス）119を繰り出し・巻き取り可能なリール120が車体121側に設けられ、電線119の一端側がヒンジ122を介してドア側のスピーカ123に接続され、電線119の他端側が車体側のオーディオ（図示せず）に接続されている。図24(a)のドア閉時において電線119はリール120から繰り出されて延び、図24(b)のドア開時において電線119はリール120に巻き取られる。

【0009】しかしながら、図23(a)(b)の構造にあっては、伸縮自在なカール状の電線114を使用するために、電線114の収納スペースが必要である上に、必然

的に電線114の実線長が長くなり、電氣的伝達損失が大きくなるという懸念があった。特に、回路数が増えたり、太い電線を使用した場合には、カール径を大きくしなければならず、実線長はさらに増大してしまう。

【0010】また、図24(a)(b)の構造にあっては、電線119の長さに応じてリール120の巻き取り回数と巻き取り軸径とが関係し、巻き取り回数が少ない場合は軸径が大きくなって装置が肥大化し、また、リール120には電線119の捩じれを防止する機構も組み込まなければならず、回路数が増えたり、太い電線を使用する場合にも装置が肥大化するという問題があった。また、図23(a)(b)～図24(a)(b)の両構造において電線114、119がカール巻きやリール巻きによって繰り返して屈曲するために、スムーズな動作を行い難いと共に、電線（回路部）114、119が傷みやすく、また、電線114、119の本数を増やすと屈曲性が悪くなり、他種類の補機の接続に対応できないという問題があった。

【0011】

【発明が解決しようとする課題】本発明は、上記従来の各構造における問題点を鑑み、接点の断続を行うことなく、スライドドアの三次元での曲線的な開閉動作に容易に対応でき、また、ワイヤハーネスが長いことに起因する電氣的伝達損失を低減させると共に、ワイヤハーネスの繰り返して屈曲に起因する傷みを解消でき、また、アームやアーム内の配線やワイヤハーネスのカール巻きやリール巻き等に起因する構造（装置）の複雑化や肥大化や高コスト化や操作性の悪化を防止でき、薄型のスライドドアに適用が可能で、また、アームを用いた場合の振れや異音や動きの悪さ等の不具合も防止でき、また、回路数を増してもワイヤハーネスの屈曲性が良好で多くの補機に対応でき、ワイヤハーネスの配線や端末処理が容易である自動車用スライドドアの給電構造を提供することを目的とする。

【0012】

【課題を解決するための手段】上記目的を達成するために、本発明は、スライドドアにスライドドア開閉方向のガイド部を設け、該ガイド部にスライダをスライド自在に係合させ、該スライダにスライドドア側のワイヤハーネスを固定し、該スライダと車体側との間で該ワイヤハーネスに湾曲部を形成したことを特徴とする自動車用スライドドアの給電構造を採用する（請求項1）。前記ガイド部の上方において前記スライドドアにハーネス支持ガイドを設け、該ハーネス支持ガイドから前記スライダにかけて前記ワイヤハーネスを吊り下げたことも有効である（請求項2）。また、前記スライダをスライドドア閉じ方向に付勢する巻取リールを備えたことも有効である（請求項3）。また、スライドドアにスライドドア開閉方向のガイド部を設け、該ガイド部にスライダをスライド自在に係合させ、該スライダに、連結された一对のリンクアームの一端側を連結し、該一对のリンクアーム

の他端側を該スライドドア側に軸支させ、該一對のリンクアームから該スライダにワイヤハーネスを配索したことを特徴とする自動車用スライドドアの給電構造を併せて採用する（請求項4）。前記スライダと車体側との間で前記ワイヤハーネスに湾曲部を形成したことも有効である（請求項5）。また、前記一對のリンクアームの一端側が軸部で前記スライダに連結され、該軸部が前記ガイド部のガイド孔にスライド自在に係合したことも有効である（請求項6）。また、前記ワイヤハーネスの湾曲部にコイル部材が外挿されたことも有効である（請求項7）。前記コイル部材が前記湾曲部の両端部に配置されたことも有効である（請求項8）。また、前記ガイド部が前記スライドドアの補強材によって構成されたことも有効である（請求項9）。前記補強材が略波型の板状補強材であり、該板状補強材に前記ガイド部としてのガイド孔が形成されたことも有効である（請求項10）。前記補強材がバー状補強材であることも有効である（請求項11）。また、前記スライドドア側に円弧状の第二のガイド部を設け、該第二のガイド部に前記一對のリンクアームのスライド係合部をスライド自在に係合させたことも有効である（請求項12）。また、前記ガイド部及び前記第二のガイド部としての各ガイド孔がインナパネル又はプレートに形成されたことも有効である（請求項13）。また、前記スライド係合部が前記一對のリンクアームの連結部に設けられたことも有効である（請求項14）。また、前記スライド係合部が一對の対向する鏝部を含み、該一對の鏝部の間に、前記第二のガイド部としてのガイド孔の周縁に係合したことも有効である（請求項15）。前記一對の鏝部の一方が小径に且つ前記第二のガイド部であるガイド孔よりも大径に形成され、該一方の鏝部に対する挿通孔が該ガイド孔の端部に連通して設けられたことも有効である（請求項16）。また、前記ガイド部が長尺板状のガイドレールであることも有効である（請求項17）。また、前記一對のリンクアームが前記ガイド部に対して上向きに配置されたことも有効である（請求項18）。また、前記ワイヤハーネスがキャブタイヤケーブルであることも有効である（請求項19）。

【0013】

【発明の実施の形態】以下に本発明の実施の形態の具体例を図面を用いて詳細に説明する。図1～図9は、本発明に係る自動車用スライドドアの給電構造（装置）の第一の実施形態を示すものである。

【0014】図1の如く、スライドドア1のインナパネル2の下部側に水平方向のガイドレール（ガイド部）3が設けられ、ガイドレール3にスライドブロック（スライダ）4がスライド自在に係合し、且つスライドブロック4が巻取リール5で後方すなわちドア開き方向に引張られ、スライドブロック4にドア側のワイヤハーネス6の中間部が固定され、ワイヤハーネス6の一方がガイ

ドローラ（ガイド部）7で支持され、ワイヤハーネス6の他方が略U字状に屈曲されて車体8側（バッテリ側）において車体側のワイヤハーネス9とコネクタ10、11で接続されている。本書では車両進行方向を前と定めている。

【0015】ガイドレール3とスライドブロック4と巻取リール5とガイドローラ7とで本例の自動車用スライドドアの給電装置Aが構成されている。巻取リール5はガイドレール3の後方においてスライドドア1のインナパネル2に固定され、ガイドローラ7はインナパネル2の高さ方向中間部において回転自在に組み付けられている。ドア側及び車体側のワイヤハーネス6、9の各コネクタ10、11は車体8のステップ部12の垂壁13の内側に固定されている。スライドドア1は下端側においてヒンジローラ14で車体側のレール15（図7）にスライド自在に係合している。

【0016】ガイドレール3は、真直な帯状の板部16の高さ方向中央にスリット（長孔）状のガイド孔17を形成し、板部16の両端と長手方向中間部とに固定部18～20を形成して成るものであり、各固定部18～20はリング状のスペーサ21を介してインナパネル2にボルト22で固定されている。インナパネル2とガイドレール3との間にはスペーサ21の板厚分の隙間23が構成されている。ガイドレール3のガイド孔17にスライドブロック4の軸部（支軸）24が貫通して係合し、例えば軸部24の先端のフランジ部（図示せず）がガイドレール3の裏側の隙間23に位置している。軸部24の外周には例えばベアリング（図示せず）が設けられ、ベアリングがガイド孔17に摺接することで、スライドブロック4が長孔状のガイド孔17に沿って水平方向にスムーズに進退する。

【0017】巻取リール5は、リール本体25の内側にワイヤ26を巻き取るためのばね手段（図示せず）を有しており、ノズル27から伸びたワイヤ26は常に引張方向に付勢されている。ワイヤ26の先端はスライドブロック4の後端に連結されている。それによってスライドブロック4は常に後方へ付勢されている。巻取リール5は、スライドドア1を閉じる際にスライドブロック4を後方へ移動しやすくする（移動を補助する）ためのものである。巻取リール5による引張力はドア側のワイヤハーネス6をピンと張っておく程度のものである。

【0018】また、ガイドローラ（ハーネス支持ガイド）7は、ガイドレール3の上方でインナパネル2に固定された軸部28と、軸部28の回りを例えばベアリングを介して回転自在なブリー状の溝付のローラ29とで構成される。断面半円状の溝30にドア側のワイヤハーネス6が外れ出しなく係合している。なお、回転自在なガイドローラ7に代えて固定式の図示しないガイド軸（ハーネス支持ガイド）を用いることも可能である。ガイド軸に同様の溝30が形成されることは言うまでもな

い。

【0019】ドア側のワイヤハーネス6はガイドローラ7から吊り下げられた状態で、スライドブロック4の移動によって揺動する。ワイヤハーネス6の先端部側はガイドローラ7の前方に短い距離で水平に延び、ワイヤハーネス6の先端側のコネクタ31でスライドドア内部の図示しないパワーウィンドモータやドアロックやスピーカといった補機のワイヤハーネスのコネクタに接続されている。コネクタ31はインナパネル2に固定されている。

【0020】スライドブロック4から車体8側へ続くワイヤハーネス6の下側部分は前方に向けて略U字状に湾曲し、この湾曲部38を介して前述の如くコネクタ10、11を介して電源線である車体側のワイヤハーネス9に続いている。車体側のワイヤハーネス9はステップ12の壁部の内面に沿って前方（バッテリー側）へ続いている。例えば一方のコネクタ10は雄型で、合成樹脂製のコネクタハウジング（符号10で代用）の内部に雌端子（図示せず）を有し、他方のコネクタ11は雌型で、コネクタハウジング（符号11で代用）の内部に雄端子（図示せず）を有している。

【0021】図2の如く、スライドブロック4は矩形状に形成され、長手方向中央に切欠された段部32を有し、段部32の前方にドア側のワイヤハーネス6を湾曲した状態で突出させている。スライドブロック4の後半部は厚肉に形成され、厚肉部33の板厚方向に押え板34を重ねさせてワイヤハーネス6を挟みつけるように固定している。押え板34にはほぼ90°に湾曲したアーチ部35が膨出形成され、厚肉部33にはアーチ部35に対応した溝部36が形成され、押え板34が小ねじ37で厚肉部33に固定され、溝部36とアーチ部35との間にワイヤハーネス6が挟持されている。

【0022】スライドブロック4とコネクタ10との間においてドア側のワイヤハーネス6のU字状の湾曲部38の外周にコイルスプリング（コイル部材）39が巻き付けられるように装着されている。コイルスプリング39はワイヤハーネス6の湾曲部38の方向付けを行うと共に、湾曲部38を擦れ等から保護する。湾曲部38の方向付けは、湾曲部38を緩やかに屈曲した状態に保ち（矯正し）、スライドブロック4の移動に伴う湾曲部38の折れ曲がりや波打ち等を防止してワイヤハーネス6の破損を防ぐためのものである。

【0023】コイルスプリング39の両端はばね力によってスライドブロック4の段部32とコネクタ10の嵌合面とは反対側の端面10aとに押接されており、段部32や端面10aから離れてずれ落ちたりすることがない。コイルスプリング39の両端をスライドブロック4とコネクタ10とに係止手段（図示せず）で固定させることも可能である。コイルスプリング39の内径をワイヤハーネス6の外径と同等ないしはそれ以下に設定し

て、ワイヤハーネス6の外周面に密着させることも可能である。

【0024】図3の如く、ドア側のワイヤハーネス6の湾曲部38においてスライドブロック4側とコネクタ10側の二箇所に限定して部分的にコイルスプリング（コイル部材）40、41を外挿することも可能である。コイルスプリング40、41の先端はスライドブロック4の段部32とコネクタ10の端面10aとに密着固定されている。図2の例と同様にコイルスプリング40、41の内径を湾曲部38の外周に密着させることも可能である。湾曲部38の両端部がコイルスプリング40、41で方向付けされるから、スライドブロック4の移動によっても常に湾曲部38がU字形状を保ち、図2の例と同様の効果を奏する。

【0025】図4の如く、本例のワイヤハーネス6としてはキャブタイヤケーブルが使用されている。キャブタイヤケーブルは例えばJIS C3327にも示される如く、内側に複数本の電線42～43を配置し、複数本の電線42～43の間に発泡ポリエチレン等の絶縁体44を充填し、絶縁体44の外側にビニル絶縁シース45を被着させたものであり、本例では太さの異なる二種類の電線42、43を挿通させている。

【0026】ワイヤハーネス6としてキャブタイヤケーブルを用いることで、完全な断面円形状のワイヤハーネス6を得ることができ、ワイヤハーネス6の屈曲性が屈曲方向によって相違することなく均一であるから、図1のガイドローラ7からスライドブロック4を経てコネクタ接続させるまでの配索作業が容易化すると共に、湾曲部38における形状保持性が良好であり、しかもコネクタ10を組み付ける際のワイヤハーネス6の切断や皮剥きや端子圧着といった端末処理も容易である。

【0027】図5の如く、スライドドア1の閉じ状態でスライドブロック4は巻取リール5のワイヤ26に引っ張られてガイドレール3の後端部に位置し、ドア側のワイヤハーネス6はスライドブロック4から前方に傾斜して立ち上がり、ガイドローラ7で支持されて前方のコネクタ31へ延びている。スライドブロック4の軸部24（図1）はガイドレール3のガイド孔17の後端に当接するか、後端に近傍に位置している。スライドブロック4が巻取リール5で引っ張られていることで、車両走行中のスライドブロック4の移動が防止され、ドア側のワイヤハーネス6の弛みや弛みに伴う磨耗や異音等が防止される。

【0028】スライドブロック4からは車体側へワイヤハーネス6の湾曲部38（図1参照）が延長されている。湾曲部38（図1）は車体8のステップ部12においてコネクタ接続により固定されている。図5で10はコネクタ、46は窓ガラス、47は把手である。

【0029】図6の如く、ワイヤハーネスの湾曲部38が車体側に連結されているために、スライドドア1の開

き状態でスライドブロック4はガイドレール3の前端部へ移動して位置する。正確には、スライドブロック4は図5のスライドドア1の閉じ状態とほぼ同じ位置にあり、スライドドア1がスライドブロック4を残して後退したことになる。巻取リール5のワイヤ26は伸ばされてスライドブロック4を後方に引っ張っているが、ワイヤハーネス6の湾曲部38の保持力でスライドブロック4は前方へ留められている。

【0030】巻取リール5は、図5の如くスライドドア1を矢印イ方向に閉じる際に、スライドブロック4を補助してスムーズに後方にスライド移動させる。スライドドア1の開閉時にワイヤハーネス6はガイドローラ7とスライドブロック4との間で揺動するが、ガイドローラ7は揺動時のワイヤハーネス6を低い摩擦力で支持し、ガイドローラ7の外周に沿ったワイヤハーネス6の屈曲動作をスムーズに行わせる。ワイヤハーネス6は揺動時に弛みを生じるが、ワイヤハーネス6の揺動部48を前方ないし後方に引っ張る弛み吸収機構（図示せず）を設けることも可能である。

【0031】図7の如く、スライドドア1の閉じ状態で、スライドドア1は車体8の外側面と同一面に位置する。スライドドア1の下端側のヒンジローラ14はレール15の前側の傾斜部15aの前端に位置する。ドア側のワイヤハーネス6（図1）の湾曲部38は上方視で根元が狭まった略U字状に屈曲して、スライドドア1の後端側に位置する。

【0032】図8の如く、スライドドア1の開き途中において、スライドドア1はレール15の屈曲形状に沿って大きく外側に突出する。スライドブロック4（図6）はスライドドア1のガイドレール3（図6）の途中に位置し、ワイヤハーネス6（図1）の湾曲部38は幅広に大きく開いて略U字状に屈曲する。ヒンジローラ14はレール15の傾斜部15aから真直部15bに沿って移動する。

【0033】図9の如く、スライドドア1の開き状態において、スライドドア1は車体8の外側面に沿って平行に位置し、ヒンジローラ14はレール15の真直部15bの後端側に位置する。スライドブロック4（図6）はスライドドア1の前端側に位置し、ワイヤハーネス6（図1）の湾曲部38はやや後方に引っ張られて傾斜した略U字状を呈する。

【0034】本実施形態によれば、ドア側のワイヤハーネス6（キャブタイヤケーブル）に湾曲部38を形成したことで、スライドドア1の三次元での曲線的な開閉動作にスムーズに対応できる。また、スライドドア1の中央上部からドア側のワイヤハーネス6を吊って、巻取リール5に連結したスライドブロック4で位置調整するという簡単な機構であるから、奥行寸法（ドアの厚さ方向の寸法）を小さくでき、薄型のスライドドア1に適用可能である。また、ドア側のワイヤハーネス6としてキャ

ブタイヤケーブルを採用したので、配索や端末処理が簡単である。

【0035】また、スライドブロック4の押え板34を小ねじ37で締め付けてドア側のワイヤハーネス6を固定する構造であるから、ワイヤハーネス6の脱着作業が容易であり、組付性やメンテナンス性が良い。また、スライドブロック4から車体側にかけてドア側のワイヤハーネス6をU字状に湾曲させたから、スライドドア開閉時のワイヤハーネス6の屈曲動作が湾曲部38においてスムーズに行われると共に、湾曲部38の弾性によってワイヤハーネス6の伸び縮みや引張力が吸収され、ワイヤハーネス6の傷みが防止される。特にコイルスプリング39～41を湾曲部38に外挿することで、外部との干渉から湾曲部38が保護されると共に、湾曲部38の形状保持が積極的に行われ、ワイヤハーネス6の伸び縮みや引張力の吸収効果が助長され、且つスライドドア開閉時にスライドブロック4がガイドレール3上の所定に位置に保持され、ワイヤハーネス6の揺動部48（図5）のばたつき等の不要な動きが防止される。また、スライドドア開閉時に巻取リール5によってもスライドブロック4の不要な進退動作が防止され、スライドブロック4がガイドレール3上の所定に位置に保持され、上記同様の効果が奏される。

【0036】図10～図15は、本発明に係る自動車用スライドドアの給電構造（装置）の第二の実施形態を示すものである。図10の如く、本例の自動車用スライドドアの給電装置Bは前例の巻取リール5（図1）をなくし、ガイドレール（ガイド部）51に二本（一対）のリンクアーム52、53を開閉自在に設け、ドア側のワイヤハーネス54を二本のリンクアーム52、53に沿って配索して、二本のリンクアーム52、53の開閉動作で伸縮させるものである。

【0037】前例同様にスライドドア1のインナパネル2の下部に水平方向のガイドレール51が固定され、ガイドレール51の長孔形状のガイド孔55にスライドブロック（スライダ）56がスライド自在に係合している。スライドブロック56に第一のリンクアーム52の一端部が軸部57（図11）を介して回転自在に連結されている。ガイドレール51の前端部に第二のリンクアーム53の一端部が軸部58（図11）を介して回転自在に連結され、第一のリンクアーム52の他端部と第二のリンクアーム53の他端部とが回転軸59で連結されている。両リンクアーム52、53は逆V字状に上向きに起立する。他の構成は第一実施形態と概ね同様である。ガイドレール51とスライドブロック56と二本のリンクアーム52、53とで本例の自動車用スライドドアの給電装置Bが構成されている。

【0038】前例同様にガイドレール51は、真直な帯状の板部60の高さ方向中央にスリット状のガイド孔55を形成し、板部60の両端と長手方向中間部とに固定

部62～64を形成して成るものであり、各固定部62～64はリング状のスペーサ65を介してインナパネル2にボルト66で固定される。インナパネル2とガイドレール51との間にはスペーサ65の板厚分の隙間67が構成されている。

【0039】ガイドレール51のガイド孔55にスライドブロック56の軸部(支軸)68が貫通して係合し、軸部68の先端のフランジ部69(図13)がガイドレール51の裏側の隙間67に位置している。軸部68はベ어링70(図13)によって回転自在であり、それによってスライドブロック56がガイド孔55に沿って水平方向にスムーズに進退する。

【0040】また、ガイドレール51の裏側において第一のリンクアーム52の一端部が軸部71(図12、図13参照)でスライドブロック56の前半部(薄肉部)72に連結されている。第一のリンクアーム52の一端部は前記隙間67内に位置し、ガイドレール51の裏面に沿ってスライドブロック56と一体に移動する。

【0041】第一のリンクアーム52の他端部に第二のリンクアーム53の他端部がラップした状態で軸部59で連結されている。第二のリンクアーム53の一端部はガイドレール51の先端側の固定部62の裏側に軸部73で回転自在に連結されている。第二のリンクアーム53の一端部も隙間67内に位置している。これらリンクアーム52、53の連結構造は図12～図13で後述する。

【0042】図10において、ドア側のワイヤハーネス54はスライドブロック56から第一のリンクアーム52と第二のリンクアーム53の各表面に沿って略逆V字状に配索され、第二のリンクアーム53の下端側からU字状に折り返されて、スライドドア1内の補機側のワイヤハーネス(図示せず)とコネクタ接続されている。ワイヤハーネス54は図示しないバンドクリップ等で各リンクアーム52、53に固定されている。各リンクアーム52、53にはワイヤハーネス54の両側において固定用の孔74が複数対設けられている。ワイヤハーネス54は軸部59の上方で若干の余長を有している。

【0043】スライドブロック56の移動に伴って、両リンクアーム52、53が前後に開閉(伸縮)し、ワイヤハーネス54がリンクアーム52、53と一体に伸縮する。両リンクアーム52、53はスライドブロック56の移動を補助すると同時に、スライドドア1内でのワイヤハーネス54の取り込み経路がスライドドア1の両端側になった時、ワイヤハーネス54の垂れ下がり防止と絡み防止とを担う。スライドブロック56の後退動作を補助する点で前例の巻取リール5(図1)と同じ働きをする。

【0044】両リンクアーム52、53はガイドレール51よりも上側に配置され、且つ逆V字状に開く如く配置されていることが必須条件であり、リンクアーム5

2、53の自重によりリンクアーム52、53が開きやすくなり、スライドブロック56の後退動作が大きな力で確実に行われる。リンクアーム52、53でスライドブロック56を後退させる力は、両リンクアーム52、53が図10の如く逆V字状に半ば開いた状態から徐々に大きくなり、スライドドア1の全開時にスライドブロック56が確実にガイドレール51の後端側へ押しやられる。

【0045】図12の如く、スライドドア1(図10)の全開状態で両リンクアーム52、53は実線で示す如く完全に閉じて上向きに垂直に起立し、スライドドア1の全開状態で両リンクアーム52、53は鎖線の如くへの字状に開く。スライドドア1の全閉状態で両リンクアーム52、53を水平方向に一直線に伸長させると、両リンクアーム52、53がロックしてスライドドア1

(図10)が開かなくなってしまうため、スライドドア1の全閉状態で両リンクアーム52、53をへの字状に保持させる必要がある。スライドドア1の全閉状態で両リンクアーム52、53がへの字状に開き、自重でもってスライドブロック56を後方に押圧しているから、車両走行中のスライドブロック56の移動が防止され、ドア側のワイヤハーネス54(図10)の弛みや弛みに伴う磨耗や異音等が防止される。

【0046】両リンクアーム52、53が閉じ状態から開き状態に移行する際に、両リンクアーム52、53を連結する中央の軸部59は円弧状の軌跡を描いて移動する。両リンクアーム52、53の開閉動作は、スライドブロック56がガイドレール51に沿って移動することで行われ、スライドブロック56はワイヤハーネス54(図10)の湾曲部75によってほぼ同じ位置に保たれる。

【0047】前述の如く第一のリンクアーム52の一端部は軸部71でスライドブロック56の前半の薄肉部72に連結され、第二のリンクアーム53の一端部は軸部73でガイドレール51の前側の固定部62に連結されている。固定部62は水平方向のガイド孔55よりも上方に突出して位置し、軸部73はガイド孔55の先端の上方に位置している。第一のリンクアーム52の軸部71はガイド孔55を貫通して位置しており、第二のリンクアーム52は第一のリンクアーム52よりもやや短く形成されている。それにより、第一のリンクアーム52が開きやすく且つ閉じやすくなっている。ガイドレール51の両側の固定部62、63と長手方向中間の固定部64とにはボルト挿通孔76～78が設けられている。

【0048】図13の如く、ガイドレール51はスライドドア1のインナパネル2からスペーサ65分の隙間67をあけて対向し、隙間67に第一のリンクアーム52と第二のリンクアーム53の各一端部が位置している。スライドブロック56はピンやボルトといった軸部68でガイドレール51のガイド孔55にスライド自在に係

合している。ガイド孔55内において軸部68の外周にベアリング70が設けられ、ベアリング70によってスライド抵抗が低減され、軸部68の先端にはフランジ部69がねじ込み固定され、フランジ部69でスライドブロック56がガイドレール51に位置決め保持されている。

【0049】また、スライドブロック56の前半の薄肉部72とガイドレール51のガイド孔55と第一のリンクアーム52の一端部とを貫通して軸部71が設けられ、軸部71の両端にフランジ部79、80が設けられ、ガイド孔55と一端部において軸部71の外周にそれぞれベアリング81が設けられ、各ベアリング81によって軸部71がガイド孔55内を低力で摺動し、且つ第一のリンクアーム52が軸部71の回りをスムーズに回転する。スライドブロック56は前後二本の軸部68と軸部71でガイド孔55内を安定にスライド移動する。

【0050】また、第一のリンクアーム52の他端部と第二のリンクアーム53の他端部とを貫通して軸部59が設けられ、軸部59の両端にフランジ部82、83が設けられ、軸部59の外周にベアリング84が設けられ、両リンクアーム52、53はベアリング84によってスムーズに回転する。

【0051】また、第二のリンクアーム53の一端部は固定部62の裏側に環状のスペーサ85を介して配置され、一端部とスペーサ85を貫通してボルトである軸部73が設けられ、一端部において軸部73の外周にベアリング86が設けられ、ベアリング86によって第二のリンクアーム53がスムーズに回転する。軸部73はフランジ部87を経てインナパネル2にねじ込まれている。

【0052】図10において、スライドブロック56から車体8側へ続くワイヤハーネス54の下側部分は前方に向けて略U字状に湾曲し、湾曲部75はコネクタ88、11を介して電源線である車体側のワイヤハーネス9に続いている。車体側のワイヤハーネス9はステップ部12の壁部の内面に沿って前方（バッテリー側）へ続いている。

【0053】図14の如く、スライドブロック56は矩形状に形成され、中央の段部89の前方、すなわち第一のリンクアーム52の軸部71に続くフランジ部80に対向してワイヤハーネス54の湾曲部75が突出している。前例同様にスライドブロック56の後半部は厚肉に形成され、厚肉部90の板厚方向に押え板91を重ねさせてワイヤハーネスを挟みつけるように固定している。押え板91にはほぼ90°に湾曲したアーチ部92が膨出形成され、厚肉部90にはアーチ部92に対応した溝93が形成され、押え板91が小ねじ94で厚肉部90に固定され、溝93とアーチ部92との間にワイヤハーネス54が挟持されている。

【0054】前例同様に、スライドブロック56とコネクタ88との間においてドア側のワイヤハーネス54のU字状の湾曲部75の外周にコイルスプリング（コイル部材）95が巻き付けられるように装着されている。コイルスプリング95はワイヤハーネス54の湾曲部75の方向付けを行うと共に、湾曲部75を擦れ等から保護する。コイルスプリング95の両端はばね力によってスライドブロック56の段部89とコネクタ88の端面88aとに押接している。

【0055】図15の如く、ドア側のワイヤハーネス54の湾曲部75においてスライドブロック56側とコネクタ88側の二箇所に限定して部分的にコイルスプリング96、97（コイル部材）を配置することも可能である。各コイルスプリング96、97の端部はスライドブロック56の段部89とコネクタ88の端面88aとに密着固定されている。図14も同様であるが、コイルスプリング96、97の内径を湾曲部75の外周に密着させることも可能である。湾曲部75の両端部がコイルスプリング96、97で方向付けされるから、スライドブロック56の移動によっても常に湾曲部75がU字形状を保つ。

【0056】第一の実施形態（図4参照）と同様に、ワイヤハーネス54としてキャブタイヤケーブルが使用されている。キャブタイヤケーブルを用いることで、完全な断面円形状のワイヤハーネス54を得ることができ、屈曲性が均一であるから、両リンクアーム52、53への配索作業や、スライドブロック56から湾曲させて車両側のワイヤハーネス9のコネクタ11に接続させるまでの配索作業が容易化すると共に、湾曲部75における形状保持性が良好であり、しかもコネクタ88を組み付ける際の端末処理も容易である。

【0057】図10において、ドア側及び車体側のワイヤハーネス54、9の各コネクタ88、11はステップ部12の垂壁13の内側に固定されている。スライドドア1は下端側においてヒンジローラ14で車体側のレール15（図7）にスライド自在に係合している。前例同様にワイヤハーネス54の湾曲部75が車体側でコネクタ接続により支持されているために、スライドドア1の開き時にスライドブロック56はガイドレール51の前端部へ移動する。正確には、スライドドア1がスライドブロック56を残して後退する。

【0058】第一の実施形態の図7～図9に示す作用は本実施形態においても同様であり、図7～図9における湾曲部の符号38を符号75と読み替えるものとする。すなわち、図7のスライドドア1の閉じ状態において、スライドドア1は車体8の外側面と同一面に位置する。スライドドア1の下端側のヒンジローラ14はレール15の前側の傾斜部15aの前端に位置する。ドア側のワイヤハーネス54（図10）の湾曲部75は上方視で元が狭まった略U字状に屈曲して、スライドドア1の後端

側に位置する。

【0059】図8のスライドドア1の開き途中において、スライドドア1はレール15の屈曲形状に沿って大きく外側に突出する。スライドブロック56（図10）はスライドドア1の途中に位置し、ワイヤハーネス54（図10）の湾曲部54は幅広に大きく開いて略U字状に屈曲する。ヒンジローラ14はレール15の傾斜部15aから真直部15bに沿って移動する。

【0060】図9とスライドドア1の開き状態において、スライドドア1は車体8の側面に沿って平行に位置し、ヒンジローラ14はレール15の真直部15bの後端側に位置する。スライドブロック56（図10）はスライドドア1の前端側に位置し、ワイヤハーネス54（図10）の湾曲部75はやや後方に引っ張られて傾斜した略U字状を呈する。

【0061】上記第二の実施形態によれば、ワイヤハーネス54をスライドブロック56とリンクアーム52、53に添わせて取り付けただけの簡単な構造であるために、奥行寸法を小さくでき、薄型のスライドドア1に適用可能である。また、一対のリンクアーム52、53を用いてワイヤハーネス54を支持したから、スライドドア1の開閉時におけるワイヤハーネス54の弛みや垂れ下がりや絡みが起こらず、またワイヤハーネス54がインナパネル2に接触して磨耗することがなく、ワイヤハーネス54が確実に保護される。また、リンクアーム52、53の自重による後退動作でスライドドア1の閉じ時にスライドブロック56が所定の位置に確実に戻されるから、ワイヤハーネス54の戻り遅れによる湾曲部75の無理な引張すなわちコネクタ88への引張負荷が防止される。

【0062】また、前記形態と同様にワイヤハーネス54の湾曲部75により、スライドドア1の三次元での曲線的な開閉動作にスムーズに対応でき、ドア側のワイヤハーネス54としてキャブタイヤケーブルを使用したので、配索や末端処理が簡単である。また、スライドブロック56の押え板91によるワイヤハーネス54の着脱作業性の向上や、湾曲部75によるワイヤハーネス54の屈曲動作のスムーズ化やワイヤハーネス54の伸び縮みや引張力の吸収作用や、コイルスプリング95～97による湾曲部75の保護や形状保持作用があることは前記形態と同様である。

【0063】なお、上記各実施形態では、スライドドア側にガイドレール3、51を設けてドア側のワイヤハーネス6、54をスライドブロック4、56と一体で移動させる構造を示したが、車体側にガイドレールを設け、ガイドレールに係合したスライドブロックに車体側のワイヤハーネスを固定し、車体側のワイヤハーネスのU字状の湾曲部を介してドア側のワイヤハーネスとコネクタ接続させる構造とすることも可能であり、この場合は例えば図1のスライドドア1を車体に、車体8をスライド

ドアに読み替えるものとする。

【0064】図16は、本発明に係る自動車用スライドドアの給電構造の第三の実施形態を示すものである。この構造は、一対の連結したリンクアーム125、126の一端側をスライドドア127側に軸支し、他端側をスライドブロック（スライダ）128に連結した構造において、スライドブロック128を水平方向スライド自在に係合させるガイドレール（ガイド部）として、側面衝突対策用の補強部材である板状補強材129を用い、板状補強材129に水平方向のスリット状の長孔であるガイド孔130を設けたことを特徴とするものである。

【0065】前記第二の実施形態におけるガイドレールを廃止し、既存の側面衝突対策用の板状補強材129を利用してガイドレールの代わりとしたことで、部品点数・部品コストが削減され、且つガイドレール単体での組付工数が削減されている。また、ガイドレールがない分、スライドドア127の重量が軽減されている。

【0066】板状補強材129は波形状に形成され、スリット状のガイド孔130は波型部131の下側の平坦部132に形成されている。波型部131は、上下方向に二つないしそれ以上の数で並列に連続した略への字状の各山部133と、上側及び下側の各山部133に続いた半山部134とで構成されている。下側の半山部134に前記平坦部132が続き、平坦部132の幅は一つの山部133の幅にほぼ等しい。平坦部132の表面と各山部133の頂点133aとはほぼ同じ高さ（スライドドア厚さ方向の高さ）に位置し、各山部133の頂点133aは前記ガイド孔130と同様に水平方向に平行に位置し、各山部133の頂点133aと上側の半山部134の頂点とに一対のリンクアーム125、126の裏面が線接触して、小さな摺動抵抗で摺接可能となっている。

【0067】波型部131は本来、板状補強材129の剛性を高めるためのものであるが、一対のリンクアーム125、126との接触面積を減らしてリンクアーム125、126の開閉動作をスムーズに行わせるためにも有効なものである。板状補強材129の上下方向の幅は図16の如くほぼ閉止する直前のリンクアーム125、126の長さ（上下方向の高さ）よりもやや低くても、あるいは高くても構わない。板状補強材129はスライドドア127の全幅と同程度ないしはやや短く、谷部の幅狭な平坦部135がボルト136等の固定手段でスライドドア127のインナパネル137に固定されている。

【0068】前側のリンクアーム126の前端部126aが板状補強材129の下側の平坦部132にボルト等の軸部138で回動自在に支持されている。軸部138はガイド孔130の前端のやや上側に位置している。前記第二の実施形態も同様であるが、前側の軸部138がガイドレールないしはスリット状のガイド孔130の直

近に位置していることで、リンクアーム 125, 126 の開閉動作が小さなスムーズに行われる。

【0069】第二の実施形態と同様に、一对のリンクアーム 125, 126 は中央の軸部 139 で連結され、後側のリンクアーム 125 の後端部 125a がスライドブロック 128 に軸部 140 で回動自在に支持されている。ワイヤハーネス 141 は一对のリンクアーム 125, 126 に沿って配索固定され、前側のリンクアーム 126 の前端側から板状補強材 129 の各山部 133 の頂点 133a に沿って上向きに配索されて、スライドドア 127 内の電装部品や補機等に接続されている。ワイヤハーネス 141 が板状補強材 129 の各山部 133 の頂点 133a にほぼ点接触で接触しているから、リンクアーム 125, 126 の開閉時におけるワイヤハーネス 141 とスライドドア側との摺接抵抗及び接触摩擦が小さく、ワイヤハーネス 141 の擦れや磨耗が防止される。

【0070】ワイヤハーネス 141 は後側のリンクアーム 125 からスライドブロック 128 を経て前向きに湾曲し、この湾曲部 141a から車両ボディ側のステップ 142 の後端側で車両ボディ側のワイヤハーネス 143 にコネクタ 144 で接続されている。

【0071】図 17 は、スライドブロック（スライダ）128 の組付構造を示すものであり、前記第二の実施形態の図 14 と同様にスライドブロック 128 は本体部分 144 と押え板 145 とに分割され、本体部分 144 の後半の厚肉部 146 に、押え板 145 のアーチ部 147 の内側の溝 148 に対向する湾曲状のワイヤハーネス收容溝 149 が形成されている。收容溝 149 にワイヤハーネス 141（図 16）を嵌合した状態で、押え板 145 が複数本の小ねじ 150 で厚肉部 146 に固定される。

【0072】收容溝 149 のやや後側に隣接して厚肉部 146 に後側の軸部 151（図 16）が設けられる。後側の軸部 151 はボルト 152 とナット部材 153 とリング 171 とで構成される。ナット部材 153 は、板状補強材 129 の裏面に接するフランジ部 154 と、フランジ部 154 の中央に突設され、内側に雌ねじ孔 155 を有し、スリット状のガイド孔 130 内に位置するボス部 156 とで構成される。リング 171 はボス部 156 の外周に回動自在に係合し、ガイド孔 130 の内面に摺接する。ボルト 152 は厚肉部 146 の挿通孔 157 に厚肉部 146 の表面側から挿通され、ボス部 156 の雌ねじ孔 155 に螺挿される。

【0073】スライドブロック 128 の本体部分 144 の前半の薄肉部 158 には後側のリンクアーム 125 の後端部 125a が前側の軸部 140（図 16）で回動自在に支持される。前側の軸部 140 は、雄ねじ部材 159 と雌ねじ部材 160 と各ねじ部材 159, 160 に係合するリング 164, 166 とで構成される。雄ねじ部

材 159 は、板状補強材 129 の裏面に接するフランジ部 161 と、フランジ部 161 の中央に突設され、ガイド孔 130 内に位置するボス部 162 と、ボス部 162 の中央に突設され、ガイド孔 130 を貫通するボルト部 163 とで構成される。リング 164 はボス部 162 の外周に回動自在に係合し、ガイド孔 130 の内面に摺接する。

【0074】雌ねじ部材 160 は、後側のリンクアーム 125 の後端部の表面に接するフランジ部 165 と、フランジ部 165 の中央に突設され、リンクアーム 125 の孔部 170 内に位置し、内側に雌ねじ孔 167 を有するボス部 168 とで構成され、ボス部 168 の外周にリング 166 が係合し、リング 166 の外周が孔部 170 に係合する。スライド部材 128 は前後の各リング 171, 164 によってガイド孔 130 に低摺動抵抗でスムーズに摺接し、且つ前側のリング 166 によってスムーズに回転する。図 17 の構造は図 14 の構造と同様である。

【0075】図 18 は、上記第三の実施形態と同様に、一对の連結したリンクアーム 125', 126' の一端側をスライドドア 172 側に軸支し、他端側をスライドブロック（スライダ）173 に連結した構造において、スライドブロック 173 を水平方向スライド自在に係合させるガイドレール（ガイド部）として、側面衝突対策用の補強部材であるパイプ形状のバー状補強材 173 を用いたことを特徴とするものである。

【0076】バー状補強材 174 はその前後両端部がブラケット 175 でスライドドア 172 のインナパネル 176 にしっかりと固定されている。各ブラケット 175 は一对の脚部 177 と、脚部 177 を連結する垂直方向の壁部 178 と、壁部 178 に一体形成された筒状の嵌合部 179 とで構成されている。各筒状の嵌合部 179 にバー状補強材 174 の各端部が挿入固定され、脚部 177 と一体の鏢部 180 がボルト 181 でインナパネル 176 に固定される。前側のブラケット 175 の上側のボルト 181 は前側のリンクアーム 126' の前端部を支持する軸部を兼ねている。

【0077】ブラケット 175 に支持されることでバー状補強材 174 はインナパネル 176 の表面からやや距離をあけてインナパネル 176 と平行に位置している。バー状補強材 174 にはやや大きめのスライドブロック 173 がスライド自在に係合している。

【0078】図 19 にスライドブロック 173 の詳細構造を示す如く、スライドブロック 173 は例えば合成樹脂を材料として板厚方向に分割可能に構成され、インナパネル 176 寄りのブロック本体 182 は略矩形状に形成され、車室寄りのブロック本体 183 は前側上部を矩形状に切欠いた形状に形成されている。両ブロック本体 182, 183 の下半部に断面半円形の摺動溝 184 が水平方向に形成され、各摺動溝 184 は合体してバー状

補強材174の外径よりも若干大径な内径を有する。各摺動溝184をさらに大径に形成し、低摺動抵抗の半割りのスリーブ（図示せず）を嵌合固定させ、スリーブの内面に沿ってバー状補強材174を摺動させることも可能である。

【0079】各ブロック本体182、183の上半部には、ワイヤハーネス141'を前向きに湾曲させた状態で保持するための断面半円形の湾曲した屈曲溝185が形成されている。インナパネル176寄りのブロック本体182には、図18の如く後側のリンクアーム125'の後端部125a'を軸部140'で回動自在に支持するための固定孔186が設けられている。両ブロック本体182、183は、バー状補強材174に係合させ、且つワイヤハーネス141'を嵌合させた状態で、複数の小ねじ187で合体固定される。

【0080】図18において、一对のリンクアーム125'、126'は中央の軸部139'で開閉自在に連結され、一对のリンクアーム125'、126'に沿ってワイヤハーネス141'が配索固定され、且つスライドブロック173を経て前向きに突出されて湾曲して後向きに折り返されてステップ後部で車両ボディ側のワイヤハーネス143'とコネクタ接続されている。

【0081】図18のバー状補強材174をガイドレールと兼用した構造によれば、新たにガイドレールを設ける必要がないから、部品コストや部品の取付工数・取付コストが削減されると共に、スライドドア172の軽量化が図られる。特に、ガイドレール174が中空のパイプ状であるから、軽量である。中実円柱状のバー状補強材（図示せず）を用いる場合も同様であるが、バー状補強材174は曲げ剛性に優れるために、撓み難く、一对のリンクアーム125'、126'の開閉時にこじり力等が作用した場合でも、曲りなく真直に位置して、スライドブロック173をスムーズに摺接可能である。

【0082】なお、バー状補強材は断面円形に限らず、断面三角形状やL形状等、種々の形状のものを適用可能である。また、図16～図19に示したガイドレールの構造を第一の実施形態（図1～図9）のガイドレールに適用することも可能である。

【0083】図20～図21は、本発明に係る自動車用スライドドアの給電構造の第四の実施形態を示すものである。この構造は、図20の如く、スライドドア1の内面側にワイヤハーネス固定部材としての略逆V字状に連結された一对のリンクアーム191、192が屈曲自在に配置され、一对のリンクアーム191、192に沿ってワイヤハーネス193が配索され、スライドドア190の内面側の平板状のプレート194に、車両前後方向に真直に延びた第一のガイド孔（ガイド部）195が設けられると共に、第一のガイド孔195の上側で円弧状に湾曲した第二のガイド孔（ガイド部）196が設けられ、プレート194に、一对のリンクアーム191、1

92の一端部191aが回動自在に軸支され、第一のガイド孔195に一对のリンクアーム191、192の他端部192a側がスライド自在に係合し、第二のガイド孔196に一对のリンクアーム191、192の連結部である中央の軸部197がスライド自在に係合したことを特徴とするものである。

【0084】プレート194は金属板あるいは合成樹脂板で長方形状に形成されたものであり、周端部がボルト198でスライドドア190のインナパネル199に固定されている。プレート194を用いずに、インナパネル199に直接、第一及び第二のガイド孔195、196を設けることも可能である。その場合、インナパネル199の少なくとも両ガイド孔195、196を設ける部分は平坦に形成しておく必要がある。

【0085】プレート194の下端部寄りにおいて第一のガイド孔195が水平に設けられている。第一のガイド孔195の前端部のやや上側において前側のリンクアーム191の前端部191aが前側の軸部200でプレート194に連結されている。前側のリンクアーム191は軸部200を中心として回動自在である。本明細書において前後とは車両進行方向の前後と一致する。

【0086】前側のリンクアーム191と後側のリンクアーム192とは前記連結部である中央の軸部197で連結されている。後側のリンクアーム192の後端部192aは矩形ブロック状のスライドブロック（スライダ）201の前端側に軸部202で回動自在に軸支され、スライドブロック201は軸部14と並列な後側の軸部203を介して第一のガイド孔195にスライド自在に係合している。軸部203には、プレート194の裏面に摺接する鏝部（図示せず）が設けられている。後側の軸部203と共に前側の軸部202を第一のガイド孔195にスライド自在に係合させることも可能である。スライドブロック201にはワイヤハーネス193の中間部が半割り状の筒部材204で固定されている。

【0087】ワイヤハーネス193は前側のリンクアーム191から後側のリンクアーム192に沿って配索固定され、スライドブロック201から湾曲して車両ボディ本体のステップ部の近傍で車両ボディ本体側のワイヤハーネス204にコネクタ206で接続されている。また、ワイヤハーネス193は前側のリンクアーム191からスライドドア190の内部に導入され、スライドドア内の図示しない電装部品に接続されている。略逆V字状に連結された一对のリンクアーム191、192と真直な第一のガイド孔195とスライドブロック201とプレート194とを用いた構成は、前記図16の第三の実施形態における板状補強材に代えてプレート194を用いた構成とほぼ同じである。

【0088】一对のリンクアーム191、192は頂部で連結され、その連結部である中央の軸部197が円弧状の第二のガイド孔196にスライド自在に係合してい

る。この点が前記実施形態にない特徴部分である。一对のリンクアーム 191, 192 の連結部である軸部 197 が円弧状の第二のガイド孔 196 にスライド自在に係合したことで、リンクアーム 191, 192 のぶれやガタ付きが防止されている。

【0089】第二のガイド孔 196 は第一のガイド孔 195 の前半部の上側に配置され、第二のガイド孔 196 の前端 196a はプレート 194 の上端部において第一のガイド孔 195 の前端 195a よりもやや後方に位置し、第二のガイド孔 196 の後端はプレート 194 の高さ方向中間部において第一のガイド孔 195 の長手方向中間部の上側に位置している。前側のリンクアーム 191 は前側の軸部 200 を中心として円運動し、第二のガイド孔 196 の円弧形状及び湾曲方向は前側のリンクアーム 191 の先端部すなわち一对のリンクアーム 191, 192 の連結部 197 の回動軌跡と一致している。

【0090】第二のガイド孔 196 の後端部にはガイド孔 197 の幅寸法 D よりも大径な円径の挿通孔 207 が形成されている。この挿通孔 207 から中央の軸部 197 の鏝部 208 (図 21) が挿入されてプレート 194 の裏面側に位置し、裏面側で第二のガイド孔 196 の周縁 209 に沿って摺接可能となる。挿通孔 207 の位置は、スライドドア 190 を閉止した際に中央の軸部 197 が到達しない位置に配置される。第二のガイド孔 196 の長さはスライドドア 190 の開閉時の前側のリンクアーム 191 の回動軌跡よりも長く設定されている。スライドドア 190 を前方へ開めるに従って中央の軸部 197 が第二のガイド孔 196 の前端側から後端側に向けて移動するが、スライドドア 190 の全閉時に軸部 197 は挿通孔 207 の手前に位置する。

【0091】これにより、スライドドア 190 の開閉時に第二のガイド孔 196 から中央の軸部 197 が外れることが防止され、一对のリンクアーム 191, 192 が常に第二のガイド孔 196 でガタ付きなく安定に支持される。また、挿通孔 207 によって中央の軸部 197 を第二のガイド孔 196 に係合させる作業が容易化する。

【0092】なお、真直な第一のガイド孔 195 とスライドブロック 201 側の前後の軸部 202, 203 との係合に挿通孔 207 と同様の構成を採用することも可能である。すなわち、第一のガイド孔 195 の後端部に軸部 202, 203 の鏝部 (図示せず) よりも大径な挿通孔 (図示せず) を形成しておく。スライドドア 190 の開閉時に最後部の軸部 203 がその挿通孔に達しないように第一のガイド孔 195 の長さを設定する。

【0093】図 21 は、一对のリンクアーム 191, 192 の連結部である中央の軸部 197 とプレート 194 の円弧状の第二のガイド孔 196 との係合状態を示す図 20 の C-C 断面図である。中央の軸部 197 は、プレート 194 を挟むようにプレート 194 の表裏面に対向した第一の鏝部 208 と第二の鏝部 210 とを有してい

る。挟むといっても強く接するのではなく、各鏝部 208, 210 が若干の隙間をもって第二のガイド孔 196 の周縁 209 に弱く接するのである。両鏝部 208, 210 は第二のガイド孔 196 の周縁に対する摺接部として作用する。

【0094】第一の鏝部 208 は短円柱状の軸本体 211 の基端側において第二のガイド孔 196 の内幅よりも大径に形成され、且つガイド孔 196 の挿通孔 207 (図 20) の内径よりもやや小径に形成されている。第二の鏝部 210 は軸本体 211 の長手方向中間部において第一の鏝部 208 及び挿通孔 207 (図 20) よりも大径に形成されている。両鏝部 208, 210 の間にプレート 194 の第二のガイド孔 196 の周縁部 209 をスライド自在に係合させる周溝 212 が構成されている。軸本体 211 と両鏝部 208, 210 とで、第二のガイド孔 196 に対するスライド係合部 213 が構成されている。中央の軸部 197 はスライド係合部 213 を一体に備えている。

【0095】第一の鏝部 208 は挿通孔 207 (図 20) からプレート 194 の裏面側に挿入され、軸本体 211 が第二のガイド孔 196 内にスライド自在に係合する。小径側の第一の鏝部 208 を挿通孔 207 内に挿入した際に、大径側の第二の鏝部 210 はプレート 194 の表面に当接する。第一の鏝部 208 と第二の鏝部 210 との間の距離はプレート 194 の板厚よりもやや大きく、両鏝部 208, 210 はプレート 194 の表裏面に沿って摺接可能である。各鏝部 208, 210 とプレート 194 との間の隙間は一对のリンクアーム 191, 192 がプレート 194 に対してガタ付きや異音を発生しない程度に小さなものである。

【0096】軸本体 211 の先端側には小径な雄ねじ部 214 が形成され、雄ねじ部 214 には鏝付きのナット部材 215 が螺合されている。前側のリンクアーム 191 の連結側端部の円孔 216 がカラー 217 を介して軸本体 211 に外挿され、後側のリンクアーム 192 の連結側端部の円孔 218 がカラー 219 を介してナット部材 215 の軸部 220 に外挿されている。両リンクアーム 191, 192 の間にはワッシャ 221 が装着されている。ナット部材 215 の鏝部 222 は後側のリンクアーム 192 に摺動自在に接している。一对のリンクアーム 191, 192 は第二の鏝部 210 と第三の鏝部 222 との間に回動自在に保持されている。第三の鏝部 222 には締め付け具 (図示せず) に対する係合孔 223 が設けられている。

【0097】なお、第二の鏝部 210 として図示しない E リングやワッシャ等を用いることも可能である。E リングの場合は軸本体 211 に周溝を形成し、ワッシャの場合は軸本体 211 に突き当て段部を形成して、第一の鏝部 208 との間でプレート 194 を強く挟まないようにする。

【0098】図20において、スライドドア190はスライド部224で車両ボディ本体側のガイドレール（図示せず）にスライド自在に係合している。図20のスライドドア190の開き中途（全開間近）の状態、一対のリンクアーム191、192は略逆V字状に起立して位置している。この状態からスライドドア190を後方にスライドさせて全開にすることで、一対のリンクアーム191、192は前側の軸部200を支点として前方に回動し、ほぼ垂直に起立する。この際、スライドブロック201は第一のガイド孔195の前端側に移動し、中央の軸部197は第二のガイド孔196の前端側に移動する。

【0099】また、図20の状態からスライドドア190を前方にスライドさせて閉止するに伴って、スライドブロック201は第一のガイド孔195に沿って後方に移動し、一対のリンクアーム191、192は鎖線の如く略へ字状に開く。この際、中央の軸部197は第二のガイド孔196に沿って円弧状に後方へ移動する。前側のリンクアーム191は前側の軸部200を支点として回動し、それに伴って中央の軸部197が第二のガイド孔196に沿って円弧状の軌跡を描く。

【0100】なお、ワイヤハーネス193はスライドブロック201から車両ボディ本体側に続く湾曲部分193aで可撓性をもって車両ボディ本体側に固定されており、それによってスライドドア190の開閉に伴う一対のリンクアーム191、192の開閉（伸縮）動作が可能となっている。スライドドア190の開閉時にワイヤハーネス193の湾曲部分193aはスライドブロック201と共に実質的にさほど移動せず、スライドドア190のみが前後に移動する。それにより、スライドドア190に対して相対的にスライドブロック201が移動したことになる。

【0101】一対のリンクアーム191、192がその中央の連結部197においてプレート194の第二のガイド孔196に係合しているから、スライドドア190の開閉操作時や車両走行時の衝撃や振動によっても、一対のリンクアーム191、192や軸部197がスライドドア190の内壁面や図示しない他の部品に擦れたりぶつかったりすることがなく、また一対のリンクアーム191、192が相互にガタ付いたりすることがなく、それにより、リンクアーム191、192やリンクアーム上のワイヤハーネス193やスライドドア190の傷付きや異音等の発生が防止される。

【0102】なお、上記第四の実施形態において、プレート194の第一及び第二のガイド孔195、196に代えて、各ガイド孔を有する各ガイドレール（図示せず）をスライドドア190のインナプレート194に直接固定することも可能である。また、ワイヤハーネス193として複数本の電線ではなく一本の電線やキャプタイヤケーブルを用いることも可能である。また、中央の

軸部197に代えて前側のリンクアーム191の連結部の近傍に、第二のガイド孔192に対するスライド係合部（図示せず）を設けることも可能である。

【0103】また、第四の実施形態（図20）のガイド孔195の構造を第一の実施形態（図1）のガイドレール3に代えて用いることも可能である。また、第一の実施形態におけるワイヤハーネスの湾曲部にコイル部材39（図2）を外挿した構造や、コイル部材41（図3）を湾曲部の両端部に配置した構造や、ワイヤハーネスがキャプタイヤケーブル6（図4）である構成を上記第三及び第四の実施形態に適用することも可能である。また、第三の実施形態の特に図18のバー状補強材174を用いた構造に第四の実施形態の第二のガイド孔196とスライド係合部213の構造を適用することも可能である。

【0104】

【発明の効果】以上の如く、請求項1、5記載の発明によれば、スライドドアの開閉操作時にワイヤハーネスの湾曲部によってスライダがほぼ一定位置に保持されると共に、スライダの若干の進退動作や、スライドドアの三次元的な動きに起因するワイヤハーネスの撓み変形が許容され、湾曲部の弾性で開閉操作時のワイヤハーネスの引張力や圧縮力が吸収されるから、スライドドアの三次元での曲線的な開閉動作に容易に対応できると共に、ワイヤハーネスの傷みやコネクタへの引張負荷が防止される。また、スライダから車体側へのワイヤハーネスの線長すなわち湾曲部の線長が短くて済むから、ワイヤハーネスが長いことに起因する電氣的伝達損失が低減される。

【0105】また、請求項2記載の発明によれば、ハーネス支持ガイドからスライダにワイヤハーネスが垂下され、スライドドアの開閉操作時にワイヤハーネスが前後に揺動する構造であるから、スライドドアの奥行寸法をとらず、薄型のスライドドアに適用可能である。

【0106】また、請求項3記載の発明によれば、スライドドアの開き操作時に巻取リールによってスライダが定位置に矯正的に戻され、湾曲部によるスライダの復元作用が補助されるから、スムーズな復元動作とスライダの定位置化が促進されると共に、ワイヤハーネスのばたつき等が抑えられ、スムーズな揺動が可能となる。また、ガイド部とスライダとハーネス支持部と巻取リールという簡単な構造で給電装置が構成され、構造が簡素化・コンパクト化する。

【0107】また、請求項4記載の発明によれば、スライドドアの開閉操作時に一対のリンクアームが伸縮（開閉）してスライダのスライド動作を補助するから、スライドドアに対して相対的にスライダとワイヤハーネスがスムーズに移動し、スライダの定位置化が促進されると共に、車体側とスライダとの間でワイヤハーネスに無理な力がかからず、ワイヤハーネスが保護される。また、

リンクアームがワイヤハーネスを支持しているから、スライドドアの開閉操作時におけるワイヤハーネスの擦れや、スライドドア全閉時におけるワイヤハーネスの垂れ下がりや絡みが防止される。また、スライドドアの開閉操作時にワイヤハーネスが一对のリンクアームと一体的に屈曲するから、ワイヤハーネスの屈曲動作がスムーズ且つ確実に行われる。また、ガイド部とスライダと一对のリンクアームという簡単な構造で給電装置が構成され、構造が簡素化・コンパクト化される。

【0108】また、請求項6記載の発明によれば、軸部によってリンクアームの回転（開閉動作）とガイド部に沿ったスライド動作とが同時にスムーズに行われる。また、軸部がガイド孔内をスライドすることでスライダの移動がスムーズに行われる。また、スライダがガイド部に二点で支持されることで、リンクアームの回転力を受けてもスライダの移動がスムーズに行われる。

【0109】また、請求項7記載の発明によれば、コイル部材によってワイヤハーネスの湾曲部が外部との干渉から保護されると共に、湾曲部の形状が保持され、湾曲部の方向付けが矯正的に行われるから、請求項1記載の発明の効果で述べた湾曲部の作用が促進される。また、請求項8記載の発明によれば、湾曲部の両端で湾曲方向が矯正されるから、請求項7と同様に湾曲部の作用が促進される。

【0110】また、請求項9記載の発明によれば、補強材がガイド部を兼ねることで、ガイド部単体の部品コストやスライドドアへの組付工数が削減され、且つスライドドアの構造の簡素化及び軽量化が図られる。また、請求項10記載の発明によれば、ガイド部（ガイド孔）が板状補強材と同一面に形成され、板状補強材の表面から突出しないから、省スペース化及びスライドドアの薄型化が可能となる。また、板状補強材の波型部分にリンクアームが接することで、リンクアームとスライドドアとの摺動抵抗が低減され、リンクアームの開閉動作がスムーズ化する。また、請求項11記載の発明によれば、バー状補強材をそのままの形でガイド部として使用できるから、ガイド孔等の加工が不要で、一層のコスト低減が可能となる。また、バー状補強材は曲げ剛性に優れるから、撓み等が少なく、それによってスライダの移動がスムーズに行われる。

【0111】また、請求項12記載の発明によれば、スライドドアの開閉時にスライダの移動に伴ってリンクアームのスライド係合部が第二のガイド部に沿って円弧状の軌跡でスライド移動する。これにより、一对のリンクアームのぶれやガタ付きや振動が防止され、スライドドア側の他部品との干渉が起こらず、リンクアームやワイヤハーネスや他部品等の傷付きや異音の発生が防止される。このことは車両走行中においても同様である。また、請求項13記載の発明によれば、ガイド部や第二のガイド部がパネルから出っ張らないから、省スペース化

とスライドドアの薄型化が可能となる。また、スライドドアのインナパネルや別体のプレートに各ガイド孔を打抜き形成することで、ガイド部や第二のガイド部を簡単に且つ低コストで形成させることができる。

【0112】また、請求項14記載の発明によれば、一番振れの大きなリンクアームの頂点である連結部にスライド係合部を設けたことで、リンクアームの振動が確実に防止される。また、連結部がスライド係合部を兼ねることで、構造が簡素化され、部品点数及び部品コストが削減される。また、請求項15記載の発明によれば、一对の鏝部の間に第二のガイド部であるガイド孔の周縁に係合して、ガイド孔の周縁が一对の鏝部の間に挟まれるように位置することで、一对のリンクアームのぶれやガタ付きが一層確実に防止される。また、請求項16記載の発明によれば、小径側の鏝部を挿通孔からガイド孔の裏側に挿通させることで、一对の鏝部を含むスライド係合部をガイド孔に簡単且つ確実に係合させることができる。小径側の鏝部はガイド孔に対するスライド係合部の抜け止め部として作用し、リンクアームの屈曲動作を円滑に行わせる。

【0113】また、請求項17記載の発明によれば、立体形状のガイドレールに較べて板状のガイドレールによってスライドドアの薄型化が可能となると共に、ガイド孔の加工が容易で、且つガイドレールの取り扱いが容易である。また、パネルやプレートにガイド孔を形成しただけのガイド部に較べて、磨耗しにくく、強度的にも有利である。また、請求項18記載の発明によれば、一对のリンクアームが自重で開くから、スライドブロックの復元動作がスムーズ且つ確実に行われる。また、請求項19記載の発明によれば、キャブタイヤケーブルの柔軟性と屈曲の均一性によってスライドドアへのワイヤハーネスの配索作業が容易化すると共に、屈曲性が良いから回路数の増加が可能で、多くの補機に対応でき、しかもコネクタ接続のための端末処理も容易化する。

【図面の簡単な説明】

【図1】本発明に係る自動車用スライドドアの給電構造の第一の実施形態（スライダを用いた構造）を示す斜視図である。

【図2】ワイヤハーネスの湾曲部の一実施形態を示す斜視図である。

【図3】ワイヤハーネスの湾曲部の他の実施形態を示す斜視図である。

【図4】ワイヤハーネスの一形態であるキャブタイヤケーブルを示す断面図である。

【図5】スライドドアを閉じた時の状態を示す正面図である。

【図6】スライドドアを開いた時の状態を示す正面図である。

【図7】スライドドアを閉じた時の状態を示す平面図である。

【図8】スライドドアを開く途中の状態を示す平面図である。

【図9】スライドドアを開いた時の状態を示す平面図である。

【図10】本発明に係る自動車用スライドドアの給電構造の第二の実施形態（リンクアームを用いた構造）を示す斜視図である。

【図11】リンクアームの取付状態を示す一部を破断した側面図である。

【図12】ガイドレール上でのリンクアームの作動状態を示す正面図である。

【図13】リンクアームの取付状態を示す一部を破断した平面図である。

【図14】ワイヤハーネスの湾曲部の一実施形態を示す斜視図である。

【図15】ワイヤハーネスの湾曲部の他の実施形態を示す斜視図である。

【図16】本発明に係る自動車用スライドドアの給電構造の第三の実施形態（補強材をガイド部とした構造）を示す斜視図である。

【図17】スライドブロックの組付構造を示す分解斜視図である。

【図18】補強材をガイド部とした自動車用スライドドアの給電構造の他の実施形態を示す斜視図である。

【図19】スライドブロックの組立構造を示す分解斜視図である。

【図20】本発明に係る自動車用スライドドアの給電構造の第四の実施形態（第二のガイド部を用いた構造）を示す斜視図である。

【図21】連結部すなわちスライド係合部を示す図20

のC-C断面図である。

【図22】一従来例を示す斜視図である。

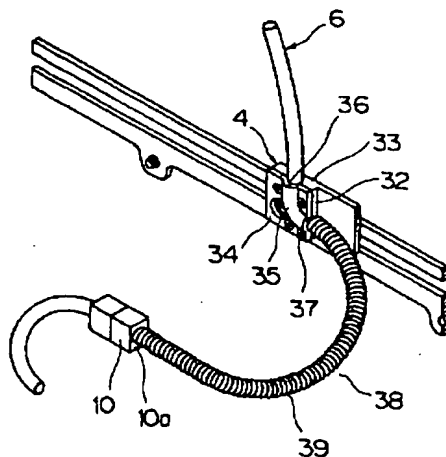
【図23】他の従来例を示し、(a) はドア閉時の横断面図、(b) はドア開時の横断面図である。

【図24】図23に類似したその他の従来例を示し、(a) はドア閉時の横断面図、(b) はドア開時の横断面図である。

【符号の説明】

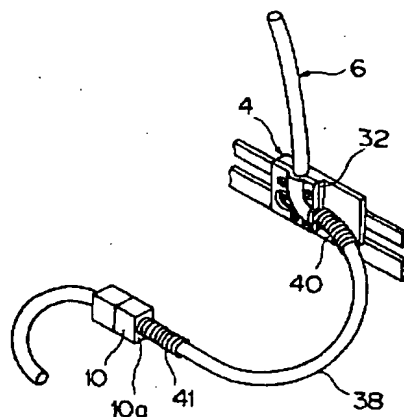
- 1, 127, 172, 190 スライドドア
- 3, 51 ガイドレール（ガイド部）
- 4, 56, 128, 173, 201 スライドブロック（スライダ）
- 5 巻取リール
- 6, 54, 141, 141', 193 ワイヤハーネス
- 7 ガイドローラ（ハーネス支持ガイド）
- 17, 55, 130, 195 ガイド孔（ガイド部）
- 24, 68, 71, 202, 203 軸部
- 38, 75, 141a, 193a 湾曲部
- 39, 95, 40~41, 96~97 コイルスプリング（コイル部材）
- 52, 53, 125, 126, 125', 126' 191, 192 リンクアーム
- 129 板状補強材
- 174 バー状補強材
- 194 プレート
- 197 軸部（連結部）
- 199 インナパネル
- 207 挿通孔
- 208, 210 鋸部

【図2】

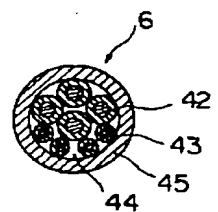


39…コイルスプリング

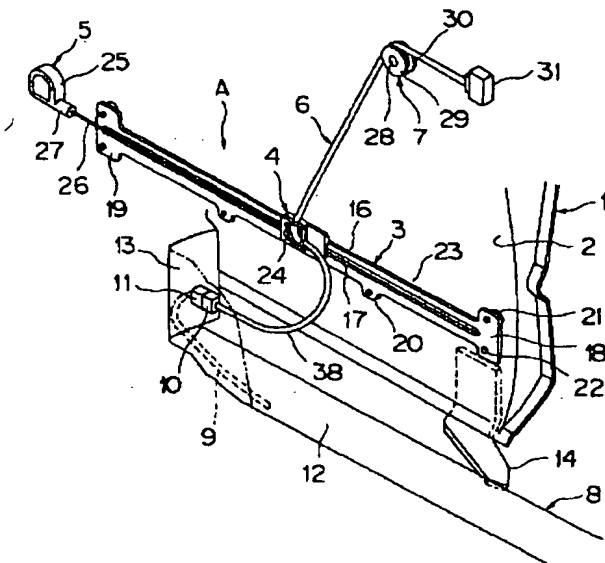
【図3】



【図4】

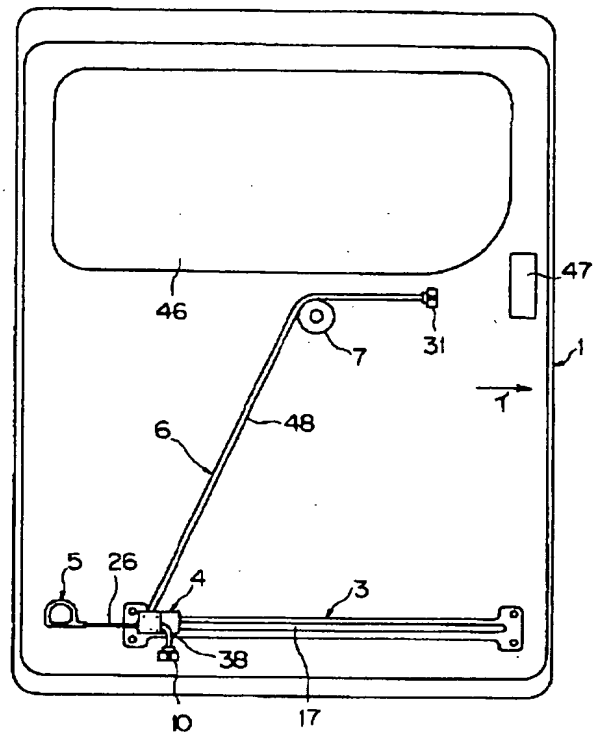


【図1】

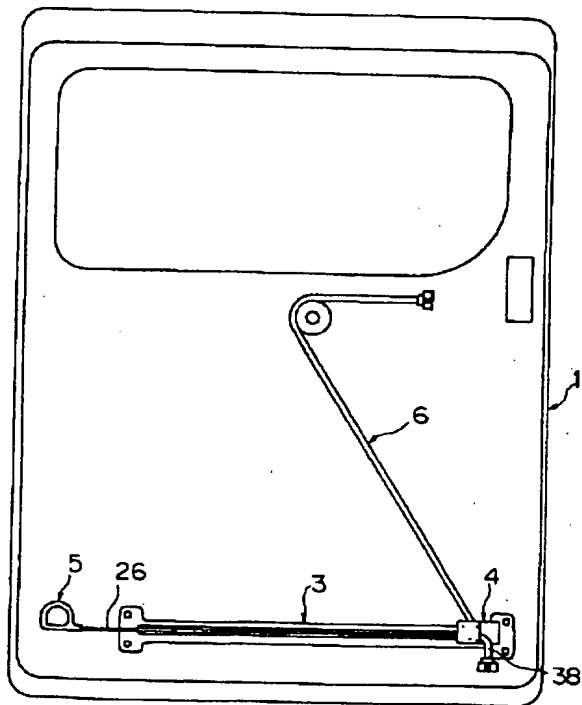


- | | |
|------------|---------|
| 3…ガイドレール | 17…ガイド孔 |
| 4…スライドブロック | 24…軸部 |
| 5…巻取リール | 38…湾曲部 |
| 7…ガイドローラ | |

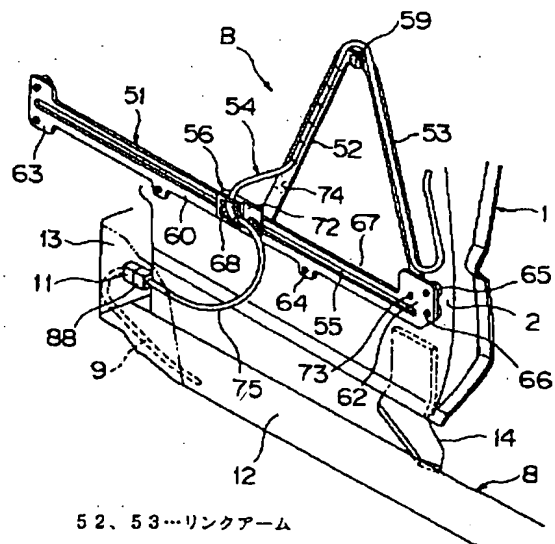
【図5】



【図6】

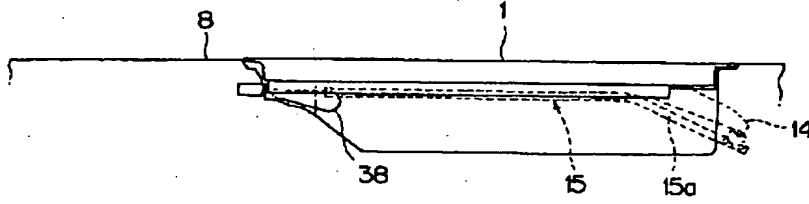


【図10】

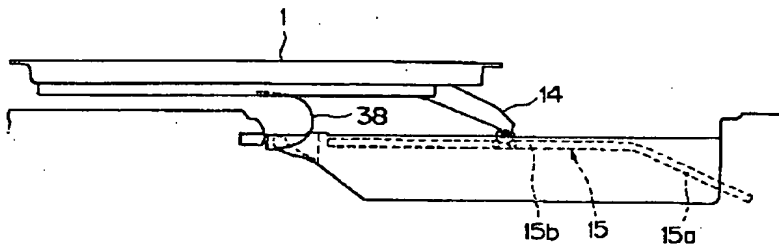


52、53…リンクアーム

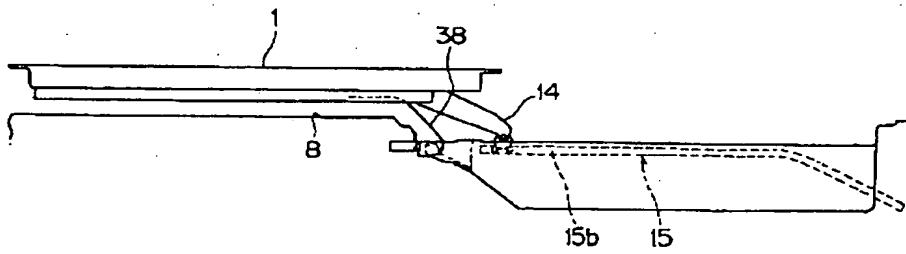
【図7】



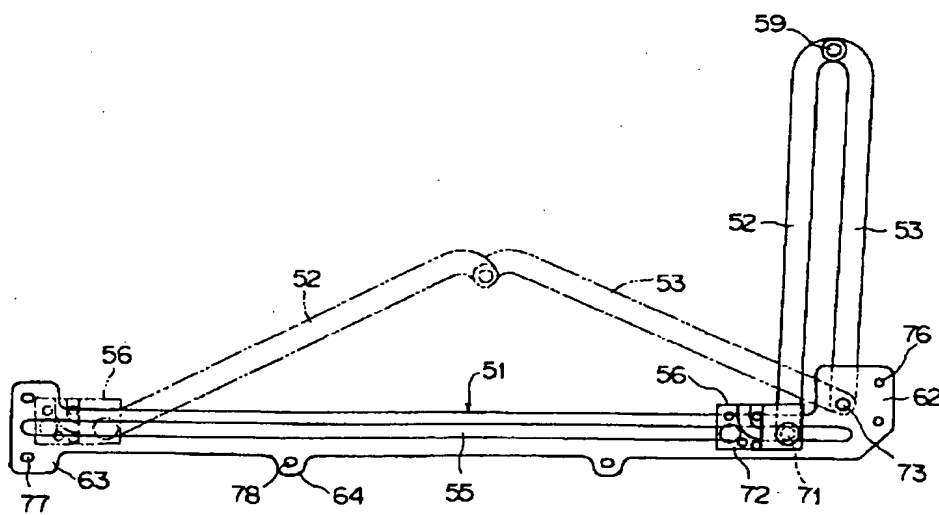
【図8】



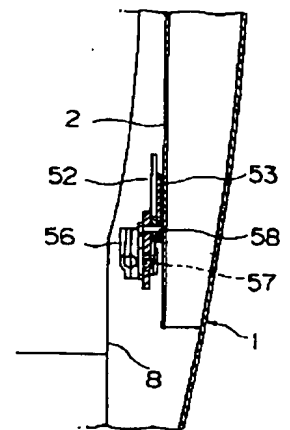
【図9】



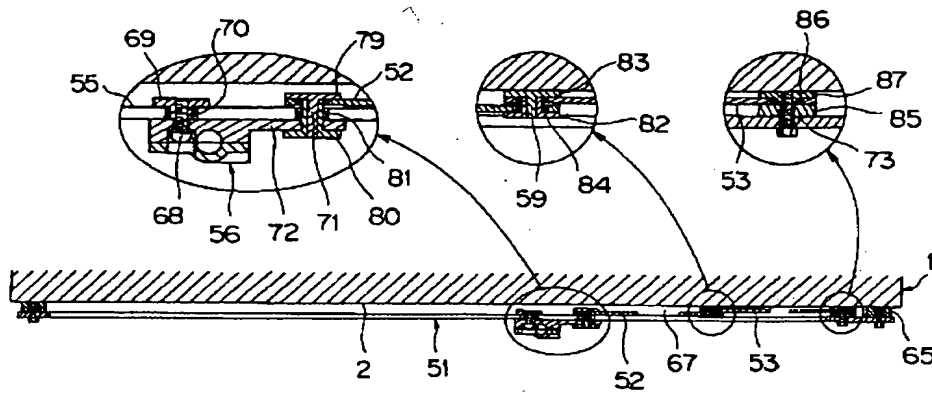
【図12】



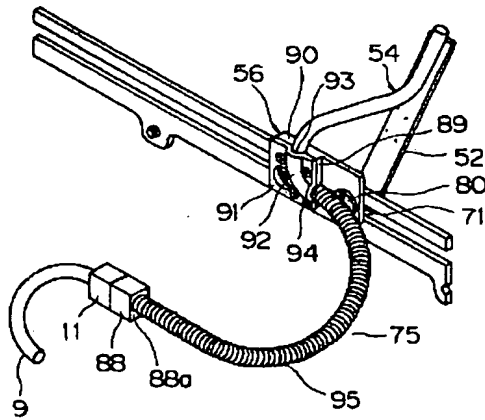
【図11】



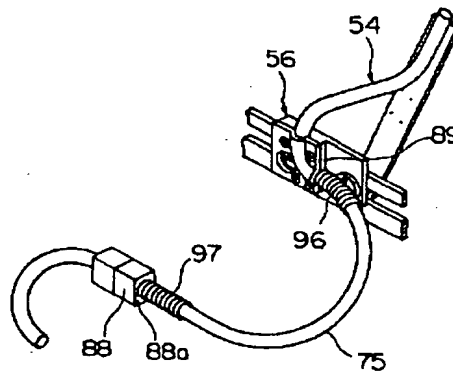
【図13】



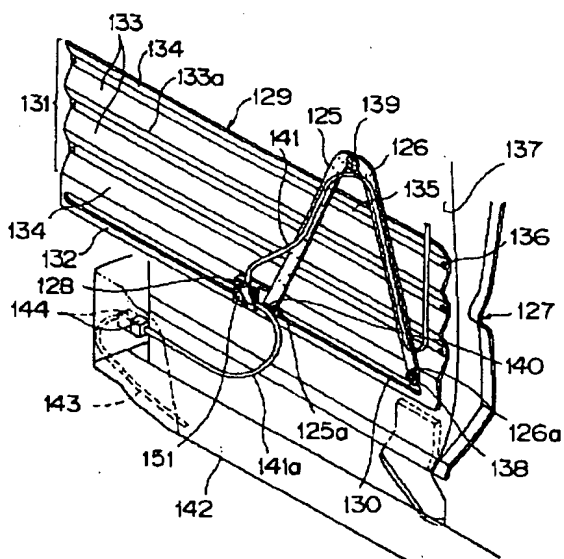
【図14】



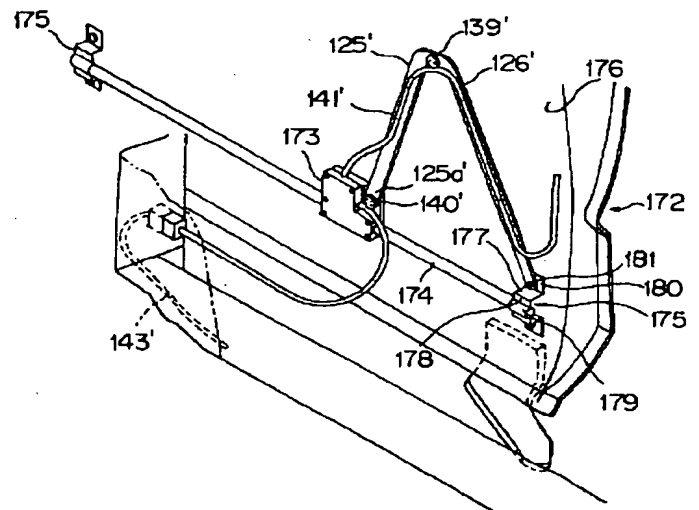
【図15】



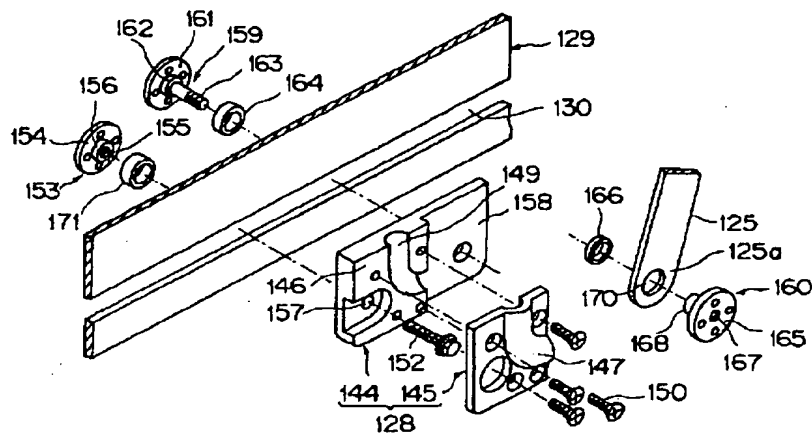
【図16】



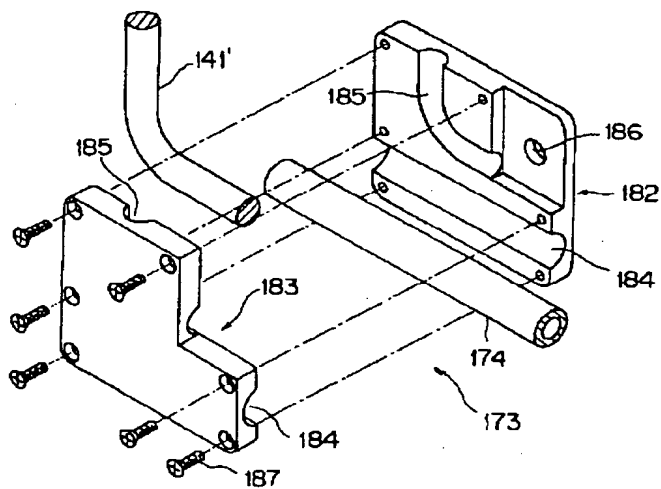
【図18】



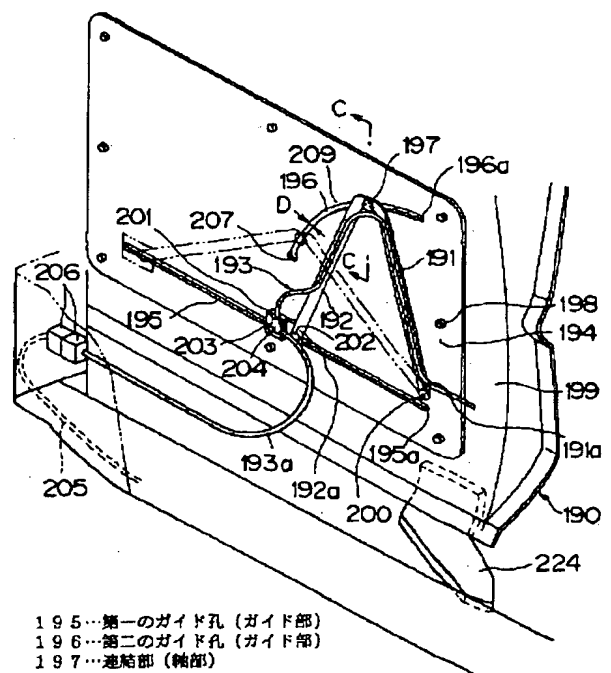
【図 17】



【図 19】

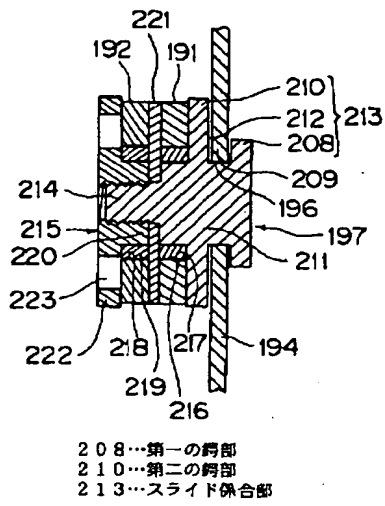


【図 20】

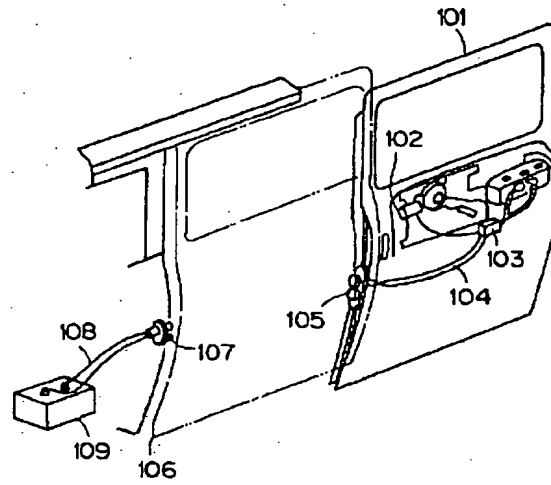


195…第一のガイド孔 (ガイド部)
 196…第二のガイド孔 (ガイド部)
 197…連結部 (軸部)
 207…挿通孔

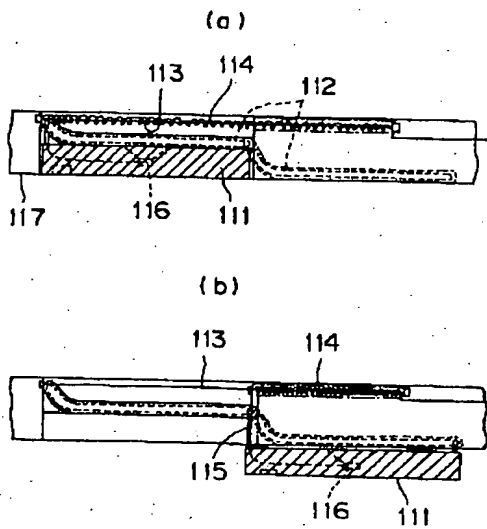
【図21】



【図22】



【図23】



【図24】

